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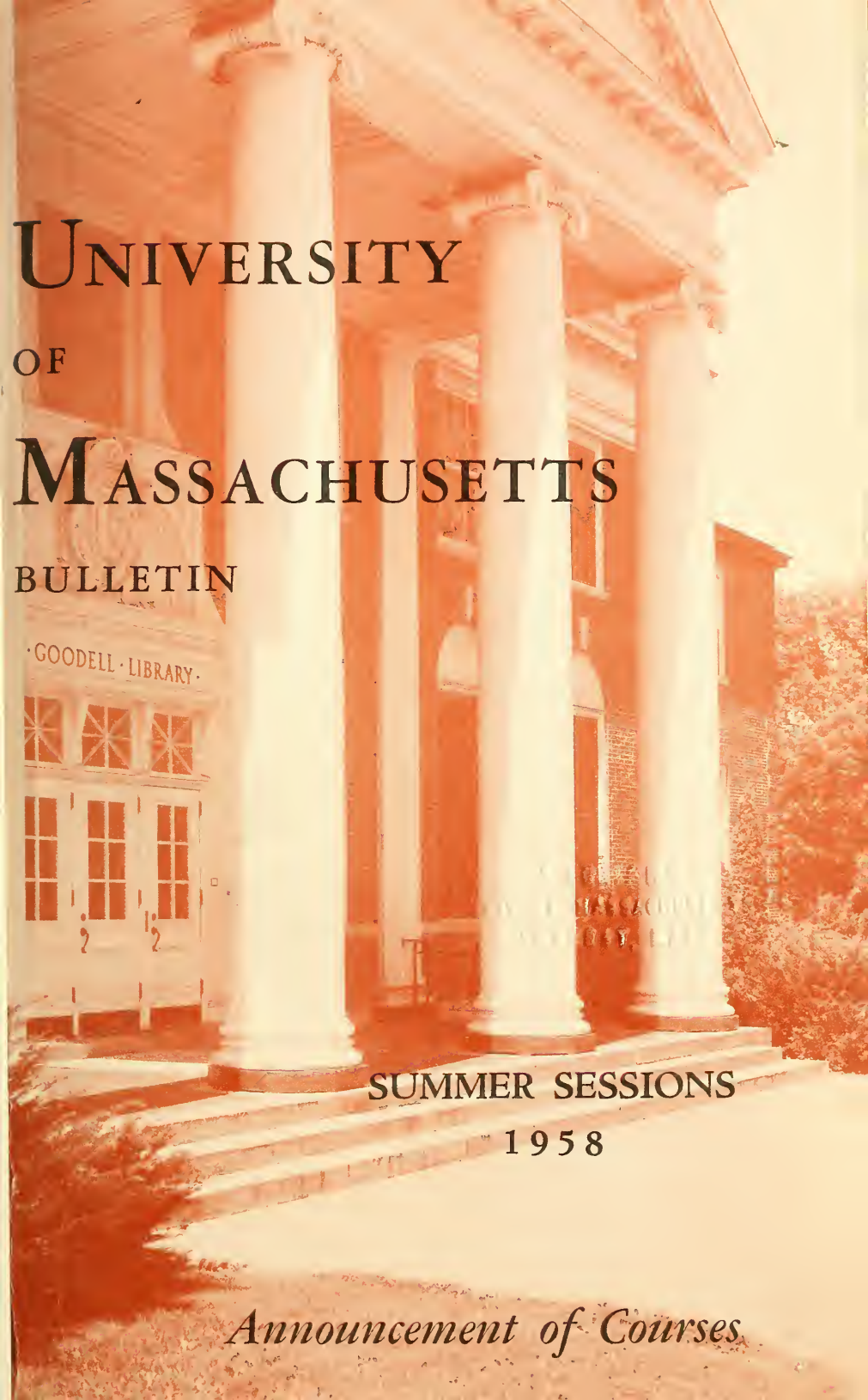

UNIVERSITY OF MASSACHUSETTS BULLETIN

SUMMER SESSIONS 1958

Announcement of Courses

Archives
1958

The University of Massachusetts is the Land-Grant University of the Commonwealth, its primary purpose being to serve the people and the interests of the State and the Nation.

Summer Session Highlights

Concentrated Teacher Training Program
for Liberal Arts and Science Graduates

Program in American Studies

Workshop Courses in Home Economics
(Nutrition and Home Management)

Work Conferences in Nursing for Graduate Nurses

Graduate Courses in French and German

Courses in Engineering, Forestry, and Nursing

Program for Entering Freshmen

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CALENDAR FOR THE TWO 5-WEEK TERMS

Session	Registration Date	Place	Time	Classes Begin	Classes End	Final Examinations
1st	June 23	Student Union Bldg.	1 p.m. to 5 p.m.	June 24 8 a.m.	July 25 12:50	July 25, 2-4 July 26, 8-12:50
2nd	July 28	Student Union Bldg.	1 p.m. to 5 p.m.	July 28 8 a.m.	Aug. 29 12:50	Aug. 29, 2-4 Aug. 30, 8-12:50

July 4, Independence Day, No University exercises.

Registration for other summer courses at Registrars' Office, South College, on the first day of the session.

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UNIVERSITY OF MASSACHUSETTS
SUMMER SESSION
1958

First Five-week Term ..... June 23 — July 26
Second Five-week Term ..... July 28 — August 30
Special Courses ..... June 2 — September 5

PROGRAMS OFFERED

Entering Freshmen

The University of Massachusetts is inviting well-qualified high school graduates to begin their college education immediately after June 1958 graduation.

In view of the rising enrollment pressures on University facilities, the University believes that for certain students, a summer program of studies might be helpful.

For the good student who, perhaps, is already convinced that his formal education will require graduate and professional studies after his undergraduate work, an early start may save him valuable time. The University does not expect students will be interested in accelerating their entire four-year undergraduate course of study. However, for many students, it will be helpful to complete approximately a year and a half of undergraduate work during a single calendar year.

The full facilities of the University of Massachusetts — its professional teaching staff, classrooms, libraries, laboratories, dining rooms and dormitories will be available this summer for two five-week terms from June 23 to July 26 and from July 28 through August 30.

June graduates of high schools, certified for college work, may begin required freshman courses including those in English, speech, languages, natural and social sciences.

This program should be especially attractive to young men who face military commitments; those interested in eventually entering graduate school, and others who wish to complete their college work in less than four years.

Teacher Training

The School of Education is offering a new program of teacher training for graduates of liberal arts and science departments or colleges who wish to train for teaching in either elementary or secondary schools and who find it difficult to take courses during the regular university year. These students will take four professional courses during the summer session and do their practice teaching in regular public schools during September and October. This program will meet the full certification requirements in many states. The program is well suited to married women who can be away from home only during July and August, because frequently the practice teaching can be done in the student's home town. For qualified students, much of the work taken in this program can count toward the degree of Master of Arts in Teaching.

The School of Education will offer, also, its usual broad program of graduate courses for teachers, administrators and other school personnel leading toward a degree or for professional improvement.

American Studies

Among the special features is a program of courses and allied activities in American Studies which should be of particular interest to English and History teachers, and other students and teachers taking work for professional improvement. Four courses in English (English 63, 163, American Poetry; English 85, 185 and 86, 186, Major American Writers; English 87, 187, Problems in American Literary and Linguistic Studies) will be offered; one course in the History of New England to 1860 (History 79, 179); two courses in American Government (Government 25) and The Presidency in American Government (Government 55); two courses in Economics, Economic History of the United States (Economics 12) and Problems of American Economy (Economics 26); and one course in American Pragmatism (Philosophy 67, 167). The University's location in the heart of a region that is rich in cultural association is a very real advantage for the program.

As in previous years, the University and the College English Association, through its national office on campus, are arranging a three-day seminar on American Studies during the period July 14-16. Several well-known scholars and writers will be in attendance to lead panel discussions and hold conferences on "Science, Technology and the Humanities in the Satellite Age."

Other Courses

Two courses taking advantage of the location of the University in the Connecticut Valley will also be offered. These courses will include field work and observation as basic parts of their programs. A course on the flora of New England (Botany 26) and the basic course in botany will have the surrounding area as a laboratory.

One course in music will be offered by the Department of Music during the first five-week term. Discovering Music (Music 51) is a non-technical course designed primarily for students desiring a general background and knowledge of this art. The course does not require formal prerequisites.

Special courses in Engineering (Chemical, Civil, and Mechanical), Forestry, and Nursing will also be offered.

Credit for Summer Work

All courses carry degree credit and are equivalent in method, content and credit to courses offered in the University during the regular academic year. Credits obtained in these courses are ordinarily accepted as transfer credits by other colleges and universities. Students desiring to pursue courses for advanced degrees must seek the approval of the Dean of the Graduate School.

Study Load

Students attending either five-week term usually carry two courses, enabling them to earn six or seven semester hours credit. University of Massachusetts undergraduates will receive permission to take more than two courses only if their scholastic average has been 3.0 quality point or better for the last two

semesters. A student from another college can enroll for more than two courses only if the appropriate official of his own college submits a statement recommending such a program and certifying that he is an honor student at that institution.

Expenses

Tuition for residents of Massachusetts	$ 5.00 per credit hour
Tuition for non-residents of Massachusetts	10.00 per credit hour
Student Health and Activities Fee	2.00 per 5-week term
Student Union Fee	1.00 per week
Room rent for five weeks	30.00
Board for five weeks (Monday through Friday) at $9.50 per week	47.50

Advance Enrollment

To expedite advance enrollment, or to obtain approval of admission, students contemplating attendance should notify the Registrar as soon as possible, using the application form on the last page of this bulletin. Graduate students must also seek approval from the Dean of the Graduate School.

Residents

New students who are residents of Massachusetts must file certificate of residence with the Treasurer's Office in order to obtain the residential tuition rate (see page 25 for form to be filled out).

Veterans

Veterans who plan to enroll under the G. I. Bill (P. L. 550) should present—not later than the time of registration—evidence of eligibility or make application for training at that time. Students already enrolled under P. L. 550 should re-enroll for Summer Session work. Under this law, veterans receive an education and training allowance from the Veterans Administration from which they pay their own university fees and purchase their own books and supplies.

SERVICES AND RECREATION

During Summer Session the facilities of the University are at the disposal of students. In addition to the classrooms, the laboratories, and library facilities available for student use, a number of other agencies and services are offered.

University Health Service

Medical consultation and treatment is available to students at the University infirmary. The infirmary, located east of the Dining Commons, furnishes ordinary medical care for students.

Residence Halls and Meals

Assignment of rooms in University residence dormitories is made on the term basis with room payment due not later than the beginning of the term. The Summer Session residence period is from June 23 to July 26 and July 28 to August 30 in most cases (two 5-week terms). Students are also accommodated for periods before and after the 5-week terms. Men will be housed in Mills dormitory and women in Crabtree dormitory. Meals will be provided to students at the Dining Commons during the two five-week terms only. Students residing in residence dormitories during these periods of time are required by University regulations to take their meals in the University Dining Commons. Meal tickets, on a five-day basis (Monday through Friday), may be secured at the Dining Commons after payment of the bill at the Treasurer's Office. Cafeteria service will be available in the coffee shop of the Student Union Building during all sessions for other students desiring food service. Married couples should write to the Housing Office at the University regarding housing accommodations.

Recreation and Entertainment

In planning for its students, the importance of recreation, entertainment, and relaxation are recognized. The natural environment in which the University is located affords almost unlimited facilities for combining recreation activities with academic and professional achievement. Indoor and outdoor extracurricular activities designed to meet varying interests of individuals are planned. Such features as band concerts, movies, and square dances will be scheduled. In addition, programs for recreation offering many informal sports such as swimming, softball, baseball, tennis and hiking will be arranged. Special lectures, a trip to the Berkshire Music Festival at Tanglewood and a play at Mountain Park will also be provided. A get-acquainted picnic will be scheduled during each of the five-week terms. A golf course, located within five minutes driving time from the University campus, is available to students upon payment of green fees.

The new Student Union Building, a center of student activity and social life, serves as a recreational center and common meeting place for students. Attractively furnished, the Union includes lounges, music listening rooms, reading rooms, game and recreation rooms, bowling alleys, ballroom, and a coffee shop.

COURSE DIRECTORY

The University reserves, for itself and its departments, the right to withdraw or change the announcements made in this catalogue.

Courses numbered 1-99 carry undergraduate credit only. Those numbered 200 or over admit graduate students only. Courses numbered 100-199 are undergraduate courses for which graduate students may receive graduate credit with the completion of additional requirements as determined by the instructor. The numbers in parentheses indicate credit value of the courses.

The timetable of summer classes, listing the times and places of class meetings and names of instructors for the 5-week terms begins on page 19 of this bulletin.

FIRST FIVE-WEEK TERM
(JUNE 23 — JULY 26)

AGRICULTURAL ENGINEERING 55. Farm Shop (3). For students in agriculture and horticulture. Laboratory exercises cover instruction and practice in the use of carpenter's tools in construction and in bench work, arc and gas welding, pipe fitting, soldering, use of machinist's tools in machinery repair, and the mixing and placing of concrete. Classroom instruction covers materials of construction and the utilization of local and special materials for these purposes.

BOTANY 1. Introductory Botany (3). The morphology and physiology plants.

BOTANY 26. Flora of New England (3). Designed primarily to acquaint the student with the local flora through the identification of the commoner vascular plants (lycopods, horsetails, ferns, gymnosperms, angiosperms) and the families they represent. In addition, laboratory and field work will include the study of native woody plants in the winter condition; the techniques of collection; and the use of a standard manual in the identification of plants.

CHEMISTRY 1. General Chemistry (3). A study of the fundamental chemical laws and theories. A considerable amount of descriptive material will be included in connection with discussions of the periodic system, atomic structure, and in various applications of the principles. The object of the course is to give the student a sound scientific training through a course in chemistry. Students who have had no previous work in chemistry will be grouped together in recitation sections so that they may have special attention.

CHEMISTRY 29. Qualitative Analysis (4). Systematic semi-micro analysis in a study of the principles and laws of the behavior of solutions of electrolytes. Prerequisites, Chemistry 1 and 2 (or equivalent).

CHEMISTRY 51. Organic Chemistry (4). A course in the theory of organic chemistry intended to serve the needs of students who will specialize in chemistry, as well as those who may specialize in other fields where a more comprehensive course is desired than Chemistry 33. The first term deals largely with compounds of the aliphatic series, while the benzene series is taken up in the second term. Students electing this course should take both 51 and 52. Prerequisite, Chemistry 29.

ECONOMICS 25. Elements of Economics (3). Definitions and introductory principles of production, exchange, and the financial organization of society, with a short survey of the economics of distribution and the use of wealth and income.

ECONOMICS 78. Public Finance (3). Principles of public revenues and expenditures with special emphasis on the systems and problems of taxation.

EDUCATION 51, 151. History of Education (3). A study of the problems of modern education as seen in historic perspective as part of great social developments.

EDUCATION 62, 162. Elementary School Arithmetic (3). Methods and materials in teaching arithmetic in elementary grades and correlating it with the total program.

EDUCATION 64, 164. Principles of Elementary Education (3). The aims, organization, program and pupil population of the elementary school and the relationship between this level of education and the secondary level which follows.

EDUCATION 66, 166. Audio-Visual Aids in Teaching (3). A wide variety of aids studied from the point of view of how they may be used effectively in teaching.

EDUCATION 209. Secondary School Administration (3). Housing, finance, schedule, library, cafeteria, supervision from the standpoint of the junior or senior high school principal.

EDUCATION 211. Community Relations for School Personnel (3). The development of good public relations, policies and techniques of assisting lay people in interpreting school activities, policies, and objectives.

EDUCATION 230. Comparative Education (3). Studies of contemporary educational systems in such countries as England, France, Germany, Russia, and Japan and comparisons of them with the system in the United States.

EDUCATION 254. Evaluation in Elementary Schools (3). Standardized and teacher made tests, rating scales, report cards, growth charts, readiness measures, and diagnosis of educational deficiency in elementary pupils.

EDUCATION 257. Children's Literature (3). A study of the basic types and foremost works in the literature for children. Attention given to different interest and vocabulary levels and to the criteria for selection of lists for individual children.
Prerequisite, Education 161.

EDUCATION 267. Construction of Audio-Visual Aids (3). An advanced course designed to help teachers and audio-visual specialists to prepare audio-visual materials for use in an educational program. Students will prepare slides, graphics, recordings, still pictures, motion pictures.
Prerequisite, Education 166.

ENGLISH 1. English Composition (2). The purpose of the course is to teach effective exposition for use in college and professional work. College-level readings will be used to attain this end and to acquaint the student (1) with the commoner critical terms and literary forms and (2) with the skills necessary to the comprehension of mature writing.

ENGLISH 25. Humane Letters (3). A general reading course based upon a chronological selection of masterpieces: classical, continental, and English.

ENGLISH 78, 178. The Contemporary Novel (3). A continuation of English 77, covering about twelve novels written between 1920 and 1950, with some consideration of social issues reflected in the fiction. English majors will not elect both English 77 and 78.

ENGLISH 85, 185. Major American Writers (3). A study of a selected group of the major American writers of the nineteenth and early twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, Henry James, Henry Adams, Fitzgerald, and Hemingway. A careful analysis will be made of the varying literary forms given to such dominant themes as nature and the conflict between the individual and society.

ENGLISH 86, 186. Major American Writers (3). A study of a selected group of the major American writers of the nineteenth and early twentieth centuries, including Cooper, Poe, Melville, Thoreau, Whitman, Mark Twain, Stephen Crane, Sinclair Lewis, and Faulkner. A careful analysis will be made of the varying literary forms given to such dominant themes as nature and the conflict between the individual and society.

FOOD TECHNOLOGY 75, 175. Food Preservation (3). For students not majoring in food technology. A survey is made of the causes of food spoilage and of the methods commonly used in preserving foods. The important food products are discussed with emphasis on raw materials used, processing methods and examination of packaged foods. Methods of detecting and preventing spoilage are studied. The laboratory exercises cover the preservation of the major food groups. The theory and use of the pressure cooker are included.

FOOD TECHNOLOGY 250. Food Colorimetry (3). Composition and properties of food colorants. Methods of measurements and specification of color in raw and processed foods. The nature, cause and control of color changes in the handling, processing and storage of food products. The application of the Munsell, C.I.E. and other color systems to commercial quality control and laboratory inspection under governmental grading standards.

FRENCH 5. Intermediate French (3). Readings from representative works of French literature. Composition, grammar review, intensive oral practice. Prerequisites, French 1 and 2 or two years of high school French.

FRENCH. Graduate Reading Course (No credit). For graduate students wishing to prepare for the graduate reading examination.

GERMAN 1. Elementary German (3). Grammar, prose, composition, and reading.

GERMAN 25. Intermediate German (3). German prose, poetry and drama. Grammar review.
Prerequisites, German 1 and 2.

GERMAN. Graduate Reading Course (No credit). For graduate students wishing to prepare for the graduate reading examination.

GOVERNMENT 25. American Government (3). A study of the principles, machinery, dynamics and problems of American national government.

GOVERNMENT 70, 170. International Organization (3). A study of international organization in the twentieth century, with emphasis upon the United Nations and regional organizations.

GOVERNMENT 93, 193. Seminar (3). A study of special problems in the field of government.

HISTORY 5. Modern European Civilization (3). A basic survey course covering the period from 1815 to present.

HISTORY 54, 154. The Far East (3). A general historical introduction to the civilization and contemporary problems of China and Japan. The first half covers the traditional civilization of China and Japan and the early impact of the west to 1890. The second half deals with revolutionary developments of the twentieth century and the place of the Far East in the world balance of power. Given in alternate years.

HISTORY 70, 170. Europe Since 1918 (3). Approximately half of the course is devoted to international affairs, the other half to a study of recent internal developments in the principal European countries.

HISTORY 79, 179. New England to 1860 (3). A survey of the colonial and early national periods, with emphasis upon the political, social and economic aspects of the life in this region.

MATHEMATICS 1. Introductory Mathematics I (3). Basic set-theoretic and axiomatic concepts, number systems and equations. A study of elementary functions, algebraically and by the methods of analytic geometry. 2 sections.

MATHEMATICS 29. Differential Calculus (3). The basic ideas and methods of the differential calculus. 2 sections.
Prerequisite, Mathematics 10.

MATHEMATICS 51. Modern Synthetic Geometry (3). An extension of the geometry of the triangle and the circle. The course is intended especially for those planning to be high school teachers.
Prerequisite, Mathematics 30.

MATHEMATICS 53. Higher Algebra (3). Permutations, combinations, probability; mathematical induction, matrices, determinants, linear equations and dependence; quadratic forms and elimination theory; the complex number system; polynominal equations; elementary theory of groups, rings and fields.
Prerequisite, Mathematics 10.

MUSIC 51. Discovering Music (3). This elementary course is non-technical and is designed primarily for students desiring a general background and knowledge of this art. With learning to listen as its motive, the course deals with the elements of music, forms in music, music compositions and composers. Excerpts from works most frequently heard and performed will be used as illustrations.

PHILOSOPHY 42. Social and Personal Ethics (3). An examination of the many causes and contexts of personal decision and policy formation; an analysis of classical and contemporay theories which attempt to provide an intellectual framework for the guidance and justification of ways of life; and

class exploration of concrete cases which focus attention on the realms of value and the place of theory in reflective choice.

PHILOSOPHY 67, 167. American Pragmatism (3). A study of the characteristically American reinterpretations of the main strands of western thought and of uniquely American contributions to philosophy. The sources of pragmatism in New England thought and in the American experience will be explored. Intensive study will be made of the works of William James and John Dewey.

PSYCHOLOGY 26. General Psychology (3). An introductory course dealing with the basic principles and applications of psychology with regard to the understanding and control of behavior.

PSYCHOLOGY 56. Educational Psychology (3). A study of psychological facts and principles fundamental to education, teaching, and personal relationships between teacher and pupil. Topics considered in relation to school situations are: physical and mental growth, intelligence, motivation, emotions, learning, transfer of training and mental hygiene of teacher and pupil.

PSYCHOLOGY 94, 194. Child Psychology (3). The course aims to develop an understanding of the behavior of the child. Psychological aspects of the following are considered: original nature, maturation, play social behavior, personality and mental hygiene.
Prerequisite, Psychology 26.

PSYCHOLOGY 95, 195. Introduction to Exceptional Children (3). Describes the behavior and adjustment of different groups of exceptional children and the problems faced in working with these groups. Emphasis is on the incidence, diagnosis, etiology and prognosis of deviations in mental, physical, socio-emotional and educational development.
Prerequisites, Psychology 26 and 94 or consent of the instructor.

SOCIOLOGY 56, 156. Race Relations (3). The social, economic, and political aspects of racial problems in the United States, with particular reference to the Negro and major ethnic groups. A rabbi, minister, and priest are invited to address the class, and visits are made to the respective churches.
Prerequisite, Sociology 25.

SOCIOLOGY 57, 157. The Family (3). The study of the development of the customs of courtship and marriage of the contemporary American family. The basic causes of changes and trends of the family are considered. Such topics as mate selection, marriage laws, marital prediction, husband-wife relations, and the role of the child are considered.
Prerequisite, Sociology 25.

SPANISH 1. Elementary Spanish (3). The essentials of Spanish grammar, intensive oral drill and intensive reading of short stories.

SPEECH 3. Public Speaking (1). This course is designed to give the student introductory instruction and opportunity in oral self-expression and includes both public speaking and literary interpretation.

SPEECH 51. Voice and Diction and Oral Interpretation (3). The course is divided into five weeks of training and drill in the correct production of speech, followed by ten weeks of practice in the fundamentals of vocal interpretation of literature. It is possible for a student to take the five weeks of voice and diction and receive one credit.

STATISTICS 77, 177. Elementary Experimental Statistics (3). Primarily for students in psychology, sociology, biology, chemistry, agronomy, poultry, animal husbandry food technology, education, and public health who are interested in obtaining and handling data of small samples. Chi square, "t" and analysis of variance tests of significance; frequency distribution, averages, dispersion, regression and simple correlation description; and chart and table presentation are the specific fields covered. Students taking this course may not take Statistics 79.

STATISTICS 79, 179. Elementary Economics Statistics (3). Primarily for students in economics, business administration, mathematics, and industrial engineering, who are interested in obtaining and presenting the data of large samples. Surveys, tables, charts, frequency distributions, averages, dispersion, standard error and its use, quality control, index numbers, time series, and simple correlation are the specific fields covered. Students taking this course may not take Statistics 77.

SECOND FIVE-WEEK TERM
(JULY 28 — AUGUST 30)

AGRICULTURAL ENGINEERING 276. Advanced Agricultural Machinery Design (3). Stress analysis, periodic vibration, and shock leadings, as related to design of agricultural machinery. The mathematical definition of tillage tool surfaces. Dynamics of suspension devices, automatic release equipment, and hydraulic systems.
Prerequisite, Agricultural Engineering 176.

CHEMISTRY 2. General Chemistry (3). Continuation of Chemistry 1.

CHEMISTRY 30. Quantitative Analysis (4). The Theory and practice of representative determinations, both gravimetric and volumetric.
Prerequisite, Chemistry 29.

CHEMISTRY 52. Organic Chemistry (4). Continuation of Chemistry 51.

ECONOMICS 12. Economic History of the United States (3). A study of the significant factors in the economic development of the nation.

ECONOMICS 26. Problems of the American Economy (3). A continuation of course 25. Current problems, including international economic relations, the determination and distribution of the national income, and the place of economic planning in peace and war are discussed.
Prerequisite, Economics 25.

EDUCATION 52, 152. Principles and Methods of Teaching (3). By means of discussion, case studies, and current educational literature, teaching ideals and procedures are set up. Application of the general principles are made in the major fields represented by the class.

EDUCATION 60, 160. Elementary School Curriculum (3). From the standpoint of content and methodology. Emphasis on the unit method and the activity program.

EDUCATION 61, 161. Elementary School Reading (3). Methods and materials in a developmental program of reading instruction.

EDUCATION 88, 188. Secondary School Curriculum (3). A consideration of learning material and activities and their organization in the subjects which the students are teaching, and the preparation of courses of study in those fields in the light of accepted educational practices.

EDUCATION 256. The Teaching of Social Studies in the Elementary School (3). A study of objectives, research and curriculum as well as methods and materials for teaching the social studies.

EDUCATION 258. Implementing the Elementary School Program (3). An advanced course in curriculum design and classroom organization. It includes practices in planning, presenting, and evaluating programs involving integration of skills and activities for the various grade levels.
Prerequisite, Education 160 and teaching experience.

EDUCATION 284. The Junior High School (3). The history, philosophy, aims and functions of a junior high school. Consideration will be given to the role of the basic skills, guidance, organization, extra-curricular activities, and evaluation of current trends.
Prerequisite, Education 164 or 183.

EDUCATION 289. Cooperative Curriculum Planning (3). Approved methods of curriculum planning, group work, consensus studies, used by cities and towns in curriculum development.
Prerequisite, Education 188 or 160.

ENGLISH 2. English Composition (2). Continuation of English 1.

ENGLISH 26. Humane Letters (3). Continuation of English 25.

ENGLISH 63, 163. American Poetry (3). A study of American poetry from Colonial times to 1900, with special emphasis upon the work of Freneau, Bryant, Emerson, Longfellow, Whittier, Poe, Whitman, and Emily Dickinson.

ENGLISH 76, 176. Modern Poetry (3). This course attempts to trace the spirit of twentieth century poetry from such authors as Hardy and Hopkins to those of the present day.

ENGLISH 87, 187. Problems in American Literary and Linguistic Studies (3). A study of the interrelationships between American literature and other aspects of American Culture.

FRENCH 6. Intermediate French (3). Continuation of French 5.

GERMAN 2. Elementary German (3). Second term of elementary German.

GERMAN 28. Scientific German (3). Intensive and extensive readings of scientific texts in various fields taken from standard German works.
Prerequisite, German 25.

GOVERNMENT 26. European Government (3). A study of the politics and institutions of Great Britain, France, U.S.S.R. and other European countries.

GOVERNMENT 55, 155. The Presidency in American Government (3). The growth of the executive in United States Government. Varying conceptions of the presidential office. Constitutional and political aspects of the office in legislation, administration and conduct of foreign and military affairs. The president as party leader.
Prerequisite, Government 25.

GOVERNMENT 63, 163. Political Parties and Elections (3). A study of the American political process, with emphasis on parties, pressure groups, and public opinion.

HISTORY 6. Modern European Civilization (3). A basic survey course covering the period from 1815 to the present.

HISTORY 69, 169. Europe, 1870-1918 (3). Internal developments of the principal countries, including political and economic changes social unrest, and intellectual currents; the development of imperialism; a detailed study of conditions and diplomacy which led to the World War; military history of the War.
Prerequisite, History 6.

MATHEMATICS 2. Introductory Mathematics II (3). A terminal course intended for students whose curriculum calls for just one year of mathematics. A continuation of Mathematics 1, including topics from the calculus, statistics, and mathematics of finance.
Prerequisite, Mathematics 1.

MATHEMATICS 4. Introductory Mathematics IV (3). A continuation of Mathematics 1 for those students intending to take further courses in mathematics. Analytic geometry and trigonometry.
Prerequisite, Mathematics 1.

MATHEMATICS 30. Integral Calculus (3). A continuation of Mathematics 29 into the field of the integral calculus, with special emphasis on application to problems. 2 sections.
Prerequisite, Mathematics 29.

PSYCHOLOGY 79, 179. Personality (3). This course provides an introduction to the scientific study of personality. The following topics will be considered: historical and contemporary conceptions of personality, constitutional foundations of personality, psychodynamic development of the self, perceptual and cognitive approaches to personality, the effect of social-cultural conditions upon behavior, personality types and traits, expressive aspects of behavior, and the concept of personality maturity.
Prerequisite, Psychology 26.

SOCIOLOGY 25. Introduction to Sociology (3). An outline study of the social order and of the individual considered as a member of his various groups.

SOCIOLOGY 53, 153. An Introductory Study of Cultural Anthropology (3). A non-technical sociological study of man in preliterate societies.
Prerequisite, Sociology 25.

SPANISH 2. Elementary Spanish (3). The essentials of Spanish grammar, intensive oral drill and intensive reading of short stories.
Prerequisite, Spanish 1.

SPEECH 3. Public Speaking (1). Continuation of Speech 3.

SPEECH 91. Extempore Speech (3). The theory and practice of public speaking for business and professional purposes.

SPECIAL COURSES

School of Engineering

CHEMICAL ENGINEERING 75. Instrumentation. A detailed study of the underlying principles and practices of indicating, recording and controlling instruments used on industrial process equipment. Credit 3
Three 40-hour weeks: June 2-20. Mr. Lindsey and Mr. Mykytiuk
Engineering Annex
Prerequisites, Physics 27, 28; Chemical Engineering 55, Calculations.

CHEMICAL ENGINEERING 88. Chemical Engineering Laboratory. A quantitative study of pilot plant size equipment illustrating some unit operations. Credit 3
Three 40-hour weeks: August 18-September 5. Mr. Cashin and Mr. Goodchild
Engineering Annex
Prerequisite, Chemical Engineering 56, Unit Operations II.

CIVIL ENGINEERING 27. Plane Surveying. The basic principles of mensuration; use of tape, transit, and level; a brief consideration of route surveying for forestry majors. Credit 3
Three 40-hour weeks: July 14-August 1. Mr. Boyer and Mr. Grow
Engineering Building
Prerequisites, Mathematics 5, Introductory Engineering Mathematics, or Mathematics 7, Algebra and Trigonometry.

CIVIL ENGINEERING 28. Property and Topographic Surveying. A transit and tape property survey requiring reference to Registry of Deeds records; also a topographical survey. Credit 3
Three 40-hour weeks: June 2-20; June 23-July 11.
Engineering Building Mr. Hendrickson and Mr. Bemben
Prerequisites, Civil Engineering 25, Surveying or Civil Engineering 27, Plane Surveying.

CIVIL ENGINEERING 30. Route Surveying Practice. A preliminary survey for a short highway location and the preparation of maps and profile. Credit 3
Three 40-hour weeks: June 2-20; June 23-July 11.
Engineering Building Mr. Bemben and Mr. Boyer
Prerequisite, Civil Engineering 25 or 27.

ELECTRICAL ENGINEERING 85. Electrical Measurements. Theory and practice of electric and magnetic measurements; accuracy, precision, and limitations of measurements devices. Credit 3
Three 40-hour weeks: June 2-20; July 28-August 15; August 18-September 5.
Mr. Fitzgerald and Mr. Laestadius
Prerequisite, Electrical Engineering 42.

MECHANICAL ENGINEERING 23. Shop. Welding and machine shop, use of various machine and hand tools used in metal working. Credit 3
Three 40-hour weeks: July 28-August 15; August 18-September 5.
Engineering Shop Mr. Sharp and Mr. Costa

MECHANICAL ENGINEERING 27. Shop. Welding, manual and automatic. For mechanical engineering majors. Credit 3
Three 40-hour weeks: June 2-20; June 23-July 11. Mr. Hopkins, Mr. Sharp, Engineering Shop Mr. Costa, Mr. Patterson

MECHANICAL ENGINEERING 28. Machine Shop. The fundamental machine tools; lathe, planer, shaper, milling machine and drill press. Credit 3
Three 40-hour weeks: June 2-20; June 23-July 11. Mr. Sharp, Mr. Costa, Engineering Shop Mr. Hopkins, Mr. Patterson

Department of Forestry and Wildlife Management

FORESTRY 55, 155. The Elements of Forest Mensuration. Methods of determining the volume and value of the forest growing stock; type mapping; methods of predicting growth of trees and stands. Credit 3
Three 44-hour weeks: June 2-20. Mr. MacConnell and Mr. Bond
Conservation Building

FORESTRY 78. Harvesting of Forest Products. Practice in the harvesting and preparation of direct forest products. Field trips to active forest properties and to visit pulpwood operations and manufacturing plants. Credit 3
Three 44-hour weeks: June 23-July 11. Mr. MacConnell and Mr. Bond
Conservation Building

School of Home Economics

HOME ECONOMICS 201 (Workshop). Developments in Nutrition Education. Consideration is given to (1) interpretation of changing and new concepts; (2) interpretation of technical material; (3) place of nutrition in schools and public health programs. Credit 3
Prerequisites, Home Economics 52 or 6 credits in physiological sciences.
2½ weeks: June 23-July 9. Mrs. Cook
Skinner Hall

HOME ECONOMICS 250 (Workshop). Home Management for Today's Families. Emphasis on management principles involved in family economics, work simplification, and decision making in the home. For teachers, extension workers and others who work in an advisory capacity with families. Credit 2-3
Prerequisites, B.S. degree in Home Economics including Home Economics 175, 77, or equivalent; and professional experience. Miss Strattner
2½ weeks: July 9-July 29.
Skinner Hall

School of Nursing

(Continuing courses with registration restricted to full-time students enrolled in the University of Massachusetts School of Nursing basic collegiate nursing program.)

CHILD STUDY 290 (S). The Teaching and Learning Process in the Early Years. The course is designed to give the students an increased understanding of the continuing influence of the family on the growing child and the influence of the developing child on his parents and siblings. Through observation and participation in the care of children (2-12 years of age), case studies, and group discussion, the student gains an appreciation of variations

in normal growth and development and parent-child relationships. Credit 4
4 weeks: July 1-August 1.
Vassar Summer Institute for Family & Community Living, Poughkeepsie, New York. Professional Staff of the Vassar Summer Institute.

NURSING 57 (S). Maternity Nursing I. Unit I of the course in maternity nursing is developed around the meaning of pregnancy to the patient and the family with special emphasis on the mother's physiological and psychological needs, before, during and after the birth of the child. Some specialized skills in maternity nursing are taught in relation to an understanding and appreciation of the phenomena of pregnancy and the birth process, the immediate care of mother and infant, newborn care, the importance for early constructive mother-child relationships, and the need for patient teaching. Credit 3
9 weeks (Dates to be announced.) Miss DiMaggio, Miss Kelly
Wesson Maternity Hospital, Springfield, Mass.

NURSING 60C (S). An extension of the courses in medical and surgical-nursing focused on the care of patients with special health problems. Credit 9
10 weeks: June 1-August 10. Miss Gilmore, Miss Clarke
Springfield Hospital, Springfield, Mass.

Work Conference for Graduate Nurses

NURSING 52A (S) G.N. Nursing of Children. A two-week work conference for the nurse practitioner with the physical, emotional, and social significance of the various stages of child growth and development. Emphasis will be placed on the role of the nurse in helping parents, teachers, and others working directly with children, to understand the needs of the infant, child, and adolescent. Credit 2
MTWTF 9 a.m.-12 noon; 1-3 p.m. Miss Reilly, Miss Kelly
June 23-July 3.

NURSING 54 (S) G.N. Interpersonal Relations in Nursing Services. The two-week work conference is designed to help nurses in hospital nursing services and in public health nursing agencies to identify the recurring interpersonal problems in nursing service. Discussion will be focused on possible methods of solving the problems as well as ways whereby problems in I. P. R. may be prevented. Credit 2
MTWTF 9 a.m.-12 noon; 1-3 p.m. Miss Kelly
June 9-20.

NURSING 58 (S) G.N. Principles and Practices in Public Health Nursing. The two-week conference is designed primarily for beginning public health nurses. Emphasis will be placed on the reconstruction of the principles of public health nursing and the relationship of these principles to improved public health nursing service to families. Credit 2
MTWTF 9 a.m.-12 noon; 1-3 p.m. Miss Shaughnessy, Dean Maher
June 23-July 3.

NURSING 70 (S) G.N. In-Service Education in Nursing Services. A two-week work conference designed primarily for nurses in hospitals and public health nursing agencies who are interested in planning, maintaining and evaluating an in-service program. Credit 2
MTWTF 9 a.m.-12 noon; 1-3 p.m. Miss Kreuter, Miss Kakosh
June 30-July 11.

GENERAL INFORMATION

For most courses (non-laboratory) Summer Session classes meet for 90 minute periods on Monday, Tuesday, Thursday, and Friday. On Wednesdays, classes will meet for 60 minutes. Class schedules for most courses (including laboratory) are listed under the timetable on pages 19-23. The timetables for special courses in Engineering, Forestry, Home Economics, and Nursing are included under the course descriptions in the bulletin. The interpretation of class periods into clock hours for non-laboratory courses follows:

Class Period	Mon., Tues., Thurs., Fri. *Hours (Morning)*	Wed. *Hours (Morning)*
1	8:00- 9:30	8:00- 9:00
2	9:40-11:10	9:10-10:10
3	11:20-12:50	11:50-12:50

Special lectures and a convocation will be scheduled on Wednesdays between class periods 2 and 3.

Abbreviations for Names of University Buildings

C.H.	Clark Hall
Ch.L.	Chenoweth Laboratory
D.H.	Draper Hall
Eng'g. Sh.	Engineering Shop
G.L.	Goessmann Laboratory
M.H.	Machmer Hall
M.B.	Memorial Building
O.C.	Old Chapel
S.H.	Stockbridge Hall
S.C.	South College

TIMETABLE

FIRST FIVE-WEEK TERM
(JUNE 23 - JULY 26)

Course	Credit	Meeting Period	Building & Room	Instructor
Agricultural Engineering				
55—Farm Shop	3	1:30-4:30 p.m. M - F	Eng'g Shop	Pira
Botany				
1—Introductory Botany	3	1:30-4:30 p.m. M - F	C.H., 105 202	Bigelow
26—Flora of New England	3	1:30-4:30 p.m. M - F	C.H., 104	Livingston
Chemistry				
1—General Chemistry	3	1:30-4:30 p.m. M - F	G.L., 28 12	Oberlander
29—Qualitative Analysis	4	Lab. (1) & (2) Lect. 1:30-2:30 M - F	G.L., 7 G.L., 26	Wynne
51—Organic Chemistry	4	Lab. 1:30-5 T.Th. Lect. (3)	G.L., 112 G.L., 26	McWhorter
Economics				
25—Elements of Economics	3	(3)	M.H., W35	Gamble
78—Public Finance	3	(1)	M.H., W35	Gamble
Education				
51, 151—History of Education	3	(1)	M.H., E35	Wiwetrout
62, 162—Elementary School Arithmetic	3	(3)	M.H., E32	Mrs. Trumbull
64, 164—Principles of Elementary Education	3	(2)	M.H., E34	Miss McManamy
66, 166—Audio-Visual Aids in Teaching	3	(1)	M.H., E36	Wyman
209—Secondary School Administration	3	(2)	M.H., E33	Oliver
211—Community Relations for School Personnel	3	(1)	M.H., E33	Oliver
230—Comparative Education	3	(2)	M.H., E35	Wiwetrout
254—Evaluation in Elementary Schools	3	(3)	M.H., E34	Miss McManamy
257—Children's Literature	3	(1)	M.H., E32	Mrs. Trumbull
267—Construction of Audio-Visual Aids	3	(3)	S.C.	Wyman

Course	Credit	Meeting Period	Building & Room	Instructor
English				
1—English Composition	2	(3)	M.H., E25	O'Donnell
25—Humane Letters	3	(2)	M.H., E25	Helming
78, 178—The Contemporary Novel	3	(3)	O.C., B	Varley
85, 185—Major American Writers	3	(1)	O.C., B	O'Donnell
86, 186—Major American Writers	3	(2)	O.C., B	Kaplan
Food Technology				
75, 175—Food Preservation	3	Lect. (1) Lab. 1:30-4:30 W.	Ch.L., 110 Ch.L.	Averill
250—Colorimetry	3	By arr.	Ch.L.	Livingston
French				
5—Intermediate French	3	(1)	M.H., W25	Hull
Graduate Reading Course	None	(1)	M.H., W27	Greenfield
German				
1—Elementary German	3	(1)	M.H., W13	Stawiecki
25—Intermediate German	3	(3)	M.H., W13	Stawiecki
Graduate Reading Course	None	(2)	M.H., W13	Heller
Government				
25—American Government	3	(1)	M.H., E17	Braunthal
70, 170—International Organization	3	(3)	M.H., E17	Braunthal
93, 193—Seminar	3	By arr.	M.H.	Staff
History				
5—Modern European Civilization	3	(1)	M.H., E25	Craig
54, 154—The Far East	3	(3)	O.C., C	Craig, McCune
70, 170—Europe Since 1918	3	(2)	O.C., C	Caldwell
79, 179—New England to 1860	3	(1)	O.C., C	Cary
Mathematics				
1—Introductory Mathematics I	3	(1)	M.H., E13	Moser
(2 sections) II		(2)	M.H., W17	Andersen
29—Differential Calculus	3	(2)	M.H., E13	Moser
(2 sections)		(3)	M.H., W17	Andersen
51, 151—Modern Synthetic Geometry	3	(1)	M.H., E16	Wagner
53, 153—Higher Algebra	3	(2)	M.H., E16	Wagner
Music				
51—Discovering Music	3	(2)	M.B.	Contino

Course	Credit	Meeting Period	Building & Room	Instructor
Philosophy				
42—Social and Personal Ethics	3	(2)	M.H., E15	Ehrlich
67, 167—American Pragmatism	3	(3)	M.H., E15	Ehrlich
Psychology				
26—General Psychology	3	(2)	M.H., W16	Miller
56—Educational Psychology	3	(3)	M.H., W16	Miller
94, 194—Child Psychology	3	(1)	M.H., W15	Clifford
95, 195—Introduction to Exceptional Children	3	(2)	M.H., W15	Clifford
Sociology				
56, 156—Race Relations	3	(3)	M.H., E27	Korson
57,157—The Family	3	(1)	M.H., E27	Korson
Spanish				
1—Elementary Spanish	3	(3)	M.H., W27	Greenfield
Speech				
3—Public Speaking	1	(2)	M.H., E17	Miss Abramson
51—Voice and Diction and Oral Interpretation	3	(3)	M.H., E13	Miss Abramson
Statistics				
77, 177—Elementary Experimental Statistics	3	1:30-3 p.m. M - F Lab. by arr.	D.H., 125	Russell
79, 179—Elementary Economics Statistics	3	Lect. (1) Lab. by arr.	D.H., 125	Russell

SECOND FIVE-WEEK TERM
(JULY 28 - AUGUST 30)

Agricultural Engineering				
276—Advanced Agricultural Machinery Design	3	By arr.	S.H.	Kleis
Chemistry				
2—General Chemistry	3	1:30-4:30 p.m. M - F	G.L., 28 12	Oberlander
30—Quantitative Analysis	4	Lab. (1) & (2) Lect. 1:30-2:30 M - F	G.L., 228 G.L., 26	Roberts
52—Organic Chemistry	4	Lect. (3) Lab. 1:30-5 T.Th.	G.L., 26 G.L., 112	McWhorter

Course	Credit	Meeting Period	Building & Room	Instructor
Economics				
12—Economic History of the United States	3	(1)	M.H., W35	Howard
26—Problems of the American Economy	3	(3)	M.H., W35	Howard
Education				
52, 152—Principles and Methods of Teaching	3	(2)	M.H., E35	Anthony
60, 160—Elementary School Curriculum	3	(3)	M.H., E33	Rogers
61, 161—Elementary School Reading	3	(2)	M.H., E32	Miss O'Leary
88, 188—Secondary School Curriculum	3	(3)	M.H., E34	Wyllie
256—The Teaching of Social Studies in the Elementary Schools	3	(1)	M.H., E33	Rogers
258—Implementing the Elementary School Program	3	(3)	M.H., E32	Miss O'Leary
284—The Junior High School	3	(1)	M.H., E35	Anthony
289—Cooperative Curriculum Planning	3	(2)	M.H., E34	Wyllie
English				
2—English Composition	2	(3)	M.H., E25	Deminoff
26—Humane Letters	3	(2)	M.H., E25	Clark
English				
63, 163—American Poetry	3	(1)	O.C., B	Miss Tilton
76, 176—Modern Poetry	3	(3)	O.C., B	Barron
87, 187—Problems in American Literary and Linguistic Studies	3	(2)	O.C., B	Miss Tilton
French				
6—Intermediate French	3	(1)	M.H., W25	Smith
German				
2—Elementary German	3	(1)	M.H., W13	Lea
28—Scientific German	3	(3)	M.H., W13	Lea
Government				
26—European Government	3	(2)	M.H., E15	————
55, 155—The Presidency in American Government	3	(3)	M.H., E17	Goodwin
63, 163—Political Parties and Elections	3	(1)	M.H., E17	Goodwin

Course	Credit	Meeting Period	Building & Room	Instructor
History				
6—Modern European Civilization	3	(1)	M.H., E25	Zeender
69, 169—Europe, 1870-1918	3	(3)	O.C., C	Zeender
Mathematics				
2—Introductory Mathematics II	3	(1)	M.H., E13	Bussel
4—Introductory Mathematics IV	3	(1)	M.H., E16	Rose
30—Integral Calculus	3	(2)	M.H., W17	Rose
(2 sections)		(3)	M.H., W17	Bussel
Psychology				
79, 179—Personality	3	(2)	M.H., W15	Kates
Sociology				
25—Introduction to Sociology	3	(1)	M.H., E27	Manfredi
53, 153—An Introductory Study of Cultural Anthropology	3	(3)	M.H., E27	Manfredi
Spanish				
2—Elementary Spanish	3	(3)	M.H., W27	Smith
Speech				
3—Public Speaking	1	(2)	M.H., E17	Niedeck
91—Extempore Speech	3	(3)	M.H., E13	Niedeck

FACULTY

Albert S. Anthony, b.s., m.a. in Teaching, ed.d., *Associate Professor of Education*

Warren Averill, sc.b., m.a., ph.d., *Associate Professor of Food Technology*

Stanley M. Bemben, b.s., in c.e., m.s., *Instructor in Civil Engineering*

Howard E. Bigelow, a.b., m.a., ph.d., *Instructor in Botany*

Robert S. Bond, b.s., m.f., *Instructor in Forestry*

William W. Boyer, b.s. in c.e., m.s. in c.e., *Assistant Professor of Civil Engineering*

Gerard Braunthal, b.a., m.a., ph.d., *Assistant Professor of Government*

Theodore C. Caldwell, b.a., a.m., ph.d., *Professor of History and Head of Department*

Harold W. Cary, a.b., a.m., ph.d., *Professor of History*

Kenneth D. Cashin, b.s. in ch.e., m.s. in ch.e., ph.d., *Associate Professor of Chemical Engineering*

David R. Clark, b.a., m.a., ph.d., *Instructor in English*

Edward Clifford, a.b., m.a., *Instructor in Psychology*

Joseph Contino, b.mus., m.a., *Assistant Professor of Music*

Mrs. Gladys Mae Cook, b.s., m.s., *Associate Professor of Home Economics*

Armand J. Costa, b.a., *Assistant Professor of Mechanical Engineering*

Albert M. Craig, b.s., *Instructor in History*

William Deminoff, b.a., a.m., *Instructor in English*

Gellestrina T. DiMaggio, a.b., m.a., m.n., *Assistant Professor of Pediatric Nursing*

Leonard H. Ehrlich, b.s., *Instructor in Philosophy*

John A. Fitzgerald, b.s. in e.e., m.s., *Assistant Professor of Electrical Engineering*

Philip L. Gamble, b.s., m.a., ph.d., *Professor of Economics and Head of Department*

Mary E. Gilmore, b.s., m.s., *Associate Professor of Nursing*

Irwin L. Goodchild, Jr., b.b.a., b.s. in ch.e., *Instructor in Chemical Engineering*

George Goodwin, Jr., b.a., m.a., ph.d., *Associate Professor of Government*

Sumner M. Greenfield, a.b., a.m., *Assistant Professor of Romance Languages*

Thomas A. Grow, b.s., m.s., *Associate Professor of Civil Engineering*

Peter Heller, b.a., m.a., ph.d., *Associate Professor of German*

Vernon P. Helming, b.a., ph.d., *Professor of English*

Karl N. Hendrickson, b.s., m.s., *Professor of Civil Engineering*

Marshall C. Howard, a.b., ph.d., *Associate Professor of Economics*

Alexander Hull, Jr., b.a., m.a., ph.d., *Assistant Professor of Romance Languages*

*Marguerite E. Kakosh, r.n., d.ed., *Consultant in Nursing*

Sidney Kaplan, b.a., m.a., *Assistant Professor of English*

Solis L. Kates, b.s., m.s., ph.d., *Professor of Clinical Psychology*

Winifred A. Kelly, b.s., m.s., *Assistant Professor of Psychiatric Nursing*

Robert W. Kleis, b.s., m.s., ph.d., *Head of Department of Agricultural Engineering*

J. Henry Korson, b.s., m.a., ph.d., *Professor of Sociology and Head of Department*

*Frances R. Kreuter, r.n., m.a., *Associate Professor of Nursing Education*

John E. Laestadius, b.e.e., m.s., *Assistant Professor of Electrical Engineering*

Henry A. Lea, b.s. in e.d., m.a., *Instructor in German*

E. Ernest Lindsey, b.s. in ch.e., d.eng., *Professor of Chemical Engineering and Head of Department*

Gideon E. Livingston, b.a., m.s., ph.d., *Assistant Professor of Food Technology*

William P. MacConnell, b.s., m.f., *Assistant Professor of Forestry*

John F. Manfredi, b.s., m.a., ph.d., *Assistant Professor of Sociology*

Shannon McCune, b.a., m.a., ph.d., *Provost*

Mary E. McManamy, b.s., *Instructor in Education*

Earl J. McWhorter, b.s., ph.d., *Assistant Professor of Chemistry*

Robert V. Miller, b.a., m.ed., m.a., *Instructor in Psychology*

Donald E. Moser, a.b., a.m., ph.d., *Assistant Professor of Mathematics*

Donald P. Mykytiuk, b.s., *Instructor in Engineering*

George J. Oberlander, b.s., m.s., *Instructor in Chemistry*

William G. O'Donnell, b.s., m.a., ph.d., *Professor of English*

Helen F. O'Leary, b.s. in ed., ed.m., *Associate Professor of Education*

Charles F. Oliver, b.s., m.s., *Associate Professor of Education*

Robert K. Patterson, b.s., *Assistant Professor of Mechanical Engineering*

Edward S. Pira, b.s., *Instructor in Agricultural Engineering*

*Margaret G. Reilly, r.n., *Instructor in Child Growth & Development*

John E. Roberts, b.s., m.s., ph.d., *Associate Professor of Chemistry*

Vincent R. Rogers, b.a., m.s., ed.d., *Assistant Professor of Education*

Israel H. Rose, b.a., m.a., ph.d., *Associate Professor of Mathematics*

Sargent Russell, b.s., m.s., ph.d., *Associate Professor of Agricultural Economics*

Arnold G. Sharp, b.s. in m.e., m.s. in m.e., *Assistant Professor of Civil Engineering*

*Mary Shaughnessy, r.n., m.s., *Assistant Professor of Public Health Nursing*

Harold L. Smith, Jr., b.a., m.a., ph.d., *Instructor in Romance Languages*

Edmund J. Stawiecki, b.s., m.a., *Instructor in German*

Mary J. Strattner, b.s., m.a., *Assistant Professor of Home Economics*

Mrs. Ann H. Trumbull, b.s., m.s., *Assistant Professor of Education*

H. Leland Varley, a.b., a.m., ph.d., *Professor of English*

Robert W. Wagner, a.b., m.a., ph.d., *Professor of Mathematics*

Robert H. Wyllie, b.s., ed.m., *Assistant Professor of Education*

Raymond Wyman, b.s., m.ed., d.ed., *Associate Professor of Education and Director of Audio-Visual Center*

Alfred M. Wynne, b.s., m.s., *Instructor in Chemistry*

John K. Zeender, b.a., m.a., ph.d., *Associate Professor of History*

* Visiting Faculty

UNIVERSITY OF MASSACHUSETTS SUMMER SCHOOL APPLICATION

Prospective students (except those enrolled at the University during the spring semester) should send this application to the Registrar, University of Massachusetts, as soon as possible. In this way admission to courses with limited enrollment can be assured. Regularly enrolled students at the University will secure a special application form at the Registrar's Office. Graduate students planning to take courses for advanced degrees must receive approval of the Dean of the Graduate School.

Name Mr. / Mrs. / Miss ..... (Last, First, Middle)

Home address ..... (Street and Number)

..... (City, State)

Date of Birth .....Sex.....Single.....Married.....

Secondary School .....Attendance Dates.....

College (s) attended .....Attendance Dates.....

What degrees and where earned .....

If you are now enrolled at another college, have the following statement completed by your Registrar (a transcript of record is not required):

This is to certify that ..... (Student's name) is in good standing at ..... (Name of college) and has our approval to take the courses listed on this application.

Signed.....

Will you be studying under the G. I. Bill? .....

Will you require a dormitory room? .....

Will you commute from home? .....

Tentative Program

A normal program consists of one course during the special session and two courses during each of the five-week terms. An additional course can be approved only in case the student's academic record is high. (See page 4 under heading, Study Load.)

List the courses for which you wish to be registered.

Courses:	Name and number	Descriptive title
.....	.....	.....
.....	.....	.....

CERITIFICATION OF RESIDENCE

To be entitled to the low tuition rate established for residents of Massachusetts, applicants for admission to the University Summer Session must return this form with the application.

Student's Name .....

Statement of Town or City Clerk

This will certify that .....
Parent or guardian's name or student's name if over 21

is a resident of .....,
Town or City

Massachusetts, on .....195 .....
Date

Signed .....

(Seal)

Title .....

NOTE: For purposes of this certification, a person is considered a resident who has established a bona fide residence or domicile in the Commonwealth with the intention of continuing to maintain it as such.

Application for Dormitory Room

Male.....

Female.....

Name .....
Last First Middle

Period of Planned attendance: First 5-week term (June 23-July 26).....

Second 5-week term (July 28-August 30).....

Special Session (list dates).....

If you have a choice of room-mate, list the name here .....

Any physical limitation? .....

Signed .....

Address .....

In addition to its program of instruction during the regular academic year and Summer Sessions, the University of Massachusetts has been a focal point for gatherings of educators, research workers, government officials, and citizens who meet to discuss problems related to the advancement of academic, professional, vocational, civic and cultural interests.

OTHER BULLETINS:

UNDERGRADUATE COURSES

GRADUATE COURSES

STOCKBRIDGE SCHOOL

UNIVERSITY OF MASSACHUSETTS

BULLETIN

UNDERGRADUATE SCHOOLS | 1958-59

UNIVERSITY
of
MASSACHUSETTS
Amherst

Catalogue of the University
1958-1959

FOREWORD

This Catalogue of the University of Massachusetts presents announcements concerning its Colleges, Schools and Divisions for the sessions of 1958-1959.

The University reserves, for itself and its departments, the right to withdraw or change the announcements made in its catalogue.

VOLUME XLIXI MARCH, 1958 NUMBER II

Published four times a year by the University of Massachusetts in February, March, April, and November.

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PUBLICATION OF THIS DOCUMENT APPROVED BY
BERNARD SOLOMON, STATE PURCHASING AGENT

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CALENDAR

1958

January

11 — Saturday, 12 noon. Classes stop.
13 — Monday, through January 21, Tuesday. Examinations.
27-28 — Monday and Tuesday. Registration.
29 — Wednesday, 8 a.m. Classes begin.

February

22 — Saturday, Washington's Birthday. No classes.

March

29 — Saturday, 12 noon to April 8, Tuesday, 8 a.m. Spring recess.

April

19 — Saturday. Patriots' Day. No classes.

May

20 — Tuesday, 5 p.m. Second semester classes close.
22 — Thursday, through May 29, Thursday. Examinations.
30 — Friday. Memorial Day.
30 — Friday, through June 1, Sunday. Commencement exercises.

SUMMER SESSION

1958

June 23 — July 26		First 5 weeks
July 28 — August 30		Second 5 weeks

September

5- 9 — Friday through Tuesday. Freshman orientation.
8- 9 — Monday, Tuesday. Registration of all students.
10 — Wednesday, 8 a.m. Classes begin.
11 — Thursday, 11 a.m. University convocation.

October

13 — Monday, Columbus Day. No University exercises.

November

8 — Saturday. Close of marks for mid-semester reports.
11 — Tuesday, Veterans' Day. No University exercises.
25 — Tuesday, 5 p.m. to Monday, December 1, 8 a.m. Thanksgiving recess.

December

20 — Saturday, 12 noon to Monday, January 5, 8 a.m. Christmas recess.

CALENDAR

1959

January

10 — Saturday, 12 noon. Classes stop.

12 — Monday, through Tuesday, January 20. Examinations.

26-27 — Monday through Tuesday, January 27. Registration of all students for second semester.

28 — Wednesday, 8 a.m. Classes begin.

29 — Thursday, 11 a.m. University convocation.

February

23 — Monday, Washington's birthday. No University exercises.

26 — Thursday, 8 a.m. to 5 p.m. Monday classes will meet.

March

21 — Saturday. Close of marks for mid-semester reports.

21 — Saturday, 12 noon to Tuesday, March 31, 8 a.m. Spring recess.

April

20 — Monday, Patriots' Day. No University exercises.

May

22 — Friday, 5 p.m. Classes stop.

25 — Monday through Wednesday, June 3. Examinations.

30 — Saturday, Memorial Day. No University exercises.

June

5 — Friday, through Sunday, June 7. Commencement.

UNDERGRADUATE MAJORS

College of Arts and Sciences

- Bacteriology
- Botany
- Chemistry
- Economics
- English
- Entomology
- Geology and Mineralogy
- German
- Government
- History
- Mathematics
- Music
- Philosophy
- Physics
- Pre-Dental
- Pre-Medical
- Pre-Veterinary
- Public Health
- Psychology
- Romance Languages
- Sociology
- Speech
- Zoology

College of Agriculture

- Agricultural Economics and Farm Management
- Agronomy
- Agrostology
- Animal Husbandry
- Dairy and Animal Science
- Floriculture
- Food Management
- Food Technology and Fisheries Technology
- Forestry
- Landscape Architecture
- Landscape Operations
- Olericulture
- Pomology
- Poultry Husbandry
- Wildlife Management

School of Business Administration

- Accounting
- Finance
- General Business Management
- Industrial Administration
- Management Training
- Marketing
- Merchandising

School of Education

- Education
- Elementary Education

School of Engineering

- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering

School of Home Economics

- Child Development and Family Life Education
- Foods, Nutrition and Institutional Administration
- Pre-research in Nutrition
- Home Economics Education and Extension
- Merchandising

School of Nursing

- General Nursing

Division of Physical Education

- Physical Education for Men
- Recreation Leadership

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RT. REV. MSGR. JOSEPH H. BOUTIN, P.D., B.S.T., B.C.L. (Labal University), Gardner 1958

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FRANK LEAROYD BOYDEN, A.B., A.M. (Amherst College), A.M. (Williams College, Yale University), SC.D. (Colgate University), PH.D. (New York State College for Teachers), LL.D. (Wesleyan University, Bowdoin College, Kenyon College, Harvard University, University of Massachusetts), L.H.D. (Amherst College, Williams College, Princeton University), LITT.D. (Tufts College), Deerfield 1960

RALPH FRED TABER, B.S. (University of Massachusetts), A.M. (Harvard University), West Newton 1960

HARRY DUNLAP BROWN, B.S. (University of Massachusetts), Billerica 1961

JOHN WILLIAM HAIGIS, B.A. (Amherst College), Greenfield 1961

JOSEPH WARREN BARTLETT, A.B. (Dartmouth College), LL.B. (Harvard University), LL.D. (University of Massachusetts), Boston 1962

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WILLIAM MICHAEL CASHIN, A.B. (Boston College), Milton 1963

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Student Union Director William David Scott	Student Union

GENERAL INFORMATION

The University of Massachusetts is the state university of the Commonwealth, founded under the provisions of the Morrill Land Grant Act of Congress of 1862. Representative Morrill envisioned the bill as "adding new securities to the perpetuity of republican institutions . . . It will prove a blessing to the whole people now and for ages to come."

Part of the great national resource of public higher institutions made possible through the Land Grant Bill, the University of Massachusetts serves Massachusetts youth in their educational needs beyond high school.

Situated in one of the most picturesque sections of the state, at Amherst, the University makes its contribution to the educational and cultural heritage maintained in the Connecticut Valley by Amherst College, Smith and Mount Holyoke colleges.

The trustees of Massachusetts Agricultural College were incorporated in 1863 and when the college was formally opened in 1867, there were four teachers and four wooden buildings. From this beginning, the institution grew steadily both in students and scope. Reflecting the broadening interests of its curriculum, the Great and General Court of Massachusetts authorized a second name, Massachusetts State College in April, 1931. The Bachelor of Arts degree was awarded in 1939 by trustee vote, in addition to the Bachelor of Science degree. In May, 1947, the Legislature approved the present name, University of Massachusetts.

The University of Massachusetts, located in the town of Amherst, has a campus of approximately 700 acres. In addition to the central campus, the University owns one area of 755 acres, six miles north of the campus on Mount Toby. An additional tract includes 1200 acres of forest land on Mount Lincoln, several miles to the east of the campus. These holdings are administered by the Department of Forestry as demonstration forests.

The University also operates a horticultural field station at Waltham and a cranberry field station at East Wareham.

The future growth of the University has been carefully planned, with provisions for buildings and facilities to accommodate an enrollment of 10,000 by 1965. The expansion has been charted in a new publication, The Master Plan.

Current construction includes expansion of chemistry laboratories, doubling the capacity of the University library, a new science center, and a new liberal arts classroom. The Legislature appropri-

ated nearly eight million dollars for the 1957 budget. Since 1947, the lawmakers have approved a total of 25 million dollars for educational facilities.

The University of Massachusetts serves the entire Commonwealth in the fields of resident instruction, research and extension.

BRANCHES OF INSTRUCTION

The Undergraduate College

The University offers four-year undergraduate instruction leading to the following degrees: Bachelor of Science, Bachelor of Arts, Bachelor of Science in Chemical, Civil, Electrical and Mechanical Engineering, Bachelor of Business Administration and Bachelor of Vocational Agriculture.

This instruction is assigned to the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing and to the Division of Physical Education. The aim of the four-year course is to give as high a degree of proficiency in some particular branch of learning as is possible without sacrificing the breadth, knowledge, and training which should characterize a well-rounded college edution.

The degree of Bachelor of Science is conferred upon those candidates who complete the curriculum requirements of the freshman and sophomore years, and 60 junior-senior credits including the specialization requirements in a particular biological or physical science department of the College of Arts and Sciences. The Bachelor of Science degree is awarded also to students who complete the curriculum requirements of the College of Agriculture, the Schools of Home Economics and Nursing, and the Division of Physical Education for men. This degree may be granted to students majoring in Education or Psychology who complete a minimum of 15 junior-senior credits in science departments of the College of Arts and Sciences.

The degree of Bachelor of Arts is awarded to all candidates who complete the curriculum requirements of the freshman and sophomore years in the College of Arts and Sciences and 60 junior-senior credits including the specialization requirements of a liberal arts department in the College. This degree may be awarded also to majors in a biological or physical science department who select a minimum of 18 junior-senior credits in liberal arts departments.

All graduates from the School of Engineering will receive the appropriate degrees of Bachelor of Science in Chemical Engineering, Civil Engineering, Electrical Engineering or Mechanical Engineering.

All graduates from the School of Business Administration will receive the degree of Bachelor of Business Administration.

Special arrangements are made for some graduates of county agricultural schools and of agricultural departments of certain high schools to complete the college course with majors in agriculture or horticulture. Upon the completion of their course they will be granted a Bachelor of Vocational Agriculture degree.

The Graduate School

Graduate courses leading to the Doctor of Philosophy degree may be taken in the following fields: Agronomy, Bacteriology, Botany, Chemistry, Economics, Entomology, Food Sciences, Food Technology and Psychology.

The following departments offer major work leading to a Master's degree: Agricultural Economics, Agricultural Engineering, Agronomy, Bacteriology, Botany, Business Administration, Chemistry, Chemical Engineering, Civil Engineering, Dairy and Animal Science, Economics, Education, Electrical Engineering, English, Entomology, Floriculture, Food Technology, Geology and Mineralogy, History, Home Economics, Landscape Architecture, Mathematics, Mechanical Engineering, Olericulture, Philosophy, Pomology, Poultry Science, Psychology, Public Health, Romance Languages, Sociology, Wildlife Management, Zoology.

The degree of Master of Landscape Architecture is granted to students completing the two years' graduate work offered by the Department of Landscape Architecture; while students taking the equivalent of one year's graduate work in that major may be granted the degree of Bachelor of Landscape Architecture.

Several other departments in the University, while not regularly organized for major work in the Graduate School, do, nevertheless, offer courses which may be selected for minor credit. These are: Forestry, German, Government, Physical Education for Men, Physics, and Veterinary Science.

The general requirements of the Graduate School regarding admission, residence, credits, tuition, etc., together with specific information concerning details of interest to prospective students, are outlined in a separate bulletin, which may be obtained upon request from the Dean of the Graduate School.

The School of Business Administration offers, through the Graduate School of the University, a program of advanced study in Business leading to the degree of Master of Business Administration.

Summer Sessions

An expanded summer program enables the student to earn nearly the equivalent of a full semester's work during two five-week sessions, beginning in June. For the first time, the sessions of the summer of 1958 will be open to freshmen who will wish to begin their college education immediately following graduation from high school. An additional bulletin describing the entire summer program will be available from the Director of the Summer Sessions. The program serves the needs of students currently enrolled in colleges; graduate students; and professional workers seeking courses in specialized fields.

The Stockbridge School of Agriculture

The University, through its Short Course division, as a special service under the Land-Grant Act by which it was established, provides a complete non-degree program of two-year technical and vocational courses in the fields of agriculture and horticulture.

This School was organized at the University in 1918 under the name of "The Two-Year Course in Practical Agriculture." Its purpose was to meet the demand for shorter courses in agriculture which might be taken by high school graduates who could not satisfy college entrance requirements or who were unable to take the four-year college course. In 1928 the School was given its present name in honor of Levi Stockbridge, first professor of agriculture at the University and its fifth president.

This program trains men and women primarily for the practice of farming or associated agricultural industries. A diploma is awarded for satisfactory completion of the course.

As the two-year program is now organized a student may choose any one of eleven vocational courses including dairy farming, dairy manufactures or milk plant operation; poultry farming, arboriculture or the care of trees; fine turf maintenance for golf courses, cemeteries, park, and play-grounds; commercial flower growing, both retail and wholesale; food management for clubs, hotels, and restaurants; commercial fruit farming, ornamental horticulture or landscape gardening; commercial vegetable farming, and applied forestry for timber growing and forest products industries.

On-the-job placement training is required of all first year students in the second semester for a period of four to seven months, depending on type of employment. No student can earn a diploma of graduation without this appplied training experience. Wages earned can pay a large part of second year expenses if the student is forced to economize.

Limited enrollment quotas in each major course make necessary early filing of application. No formal entrance examinations are required for non-degree short courses.

A catalogue, giving complete description of all two-year courses offered in The Stockbridge School of Agriculture, as well as full details on estimated costs, employment opportunities in each field, and entrance arrangements is available. Application form is printed in the catalogue. Write to Director of Short Courses, University of Massachusetts, Amherst.

Other Non-Degree Short Courses

Other short courses, varying in length from one to ten weeks, furnish supplementary training for city and town sanitary inspectors, tree wardens and city foresters, golf course greenkeepers, and skilled workers in dairy and ice cream plants. A certificate is presented upon the satisfactory completion of the course.

Research and Regulatory Services

The University of Massachusetts serves the fields of agriculture and horticulture through its Experiment Station, which provides research and regulatory services. Experiment stations were established in all states as the need of development of practical information on subjects relating to agriculture became apparent. Through the efforts of experiment stations a fund of scientific knowledge applicable to agriculture and horticulture has been accumulated, and research workers in the experiment stations continue to contribute to this knowledge by constant research and experimentation.

At the University of Massachusetts, the Experiment Station service has expanded until it now deals with problems in the following fields of specialization: Agricultural Economics and Farm Management, Agronomy, Animal Husbandry, Bacteriology, Botany, Chemistry, Dairy Industry, Economics, Engineering, Entomology, Horticulture, Floriculture, Food Technology, Nutrition, Olericulture, Pomology, Poultry Science, and Veterinary Science. Most of the research activities of the University of Massachusetts are undertaken at the main Experiment Station at Amherst. There are, however, two substations, one at Waltham, devoted largely to the problems of horticulture as applied to olericulture, floriculture, and nursery culture, and one at East Wareham, where attempts are in progress to solve the problems of the cranberry and blueberry growers.

In addition to the work described above, the administration of certain regulatory services, as pertaining to the sale of feeds, fertilizers, and seeds and to the use of dairy glassware, is also assigned to the Experiment Station which is equipped with the necessary laboratory facilities and personnel for that purpose.

Extension Service

The Massachusetts Extension Service is a cooperative teaching effort between the United States Department of Agriculture, the University of Massachusetts and the several counties of the State. The work of the Extension Service is carried on through unified teaching programs in all parts of Massachusetts. The Extension Service assists the people of the farm, the home, and the rural communities to improve agriculture, home making, and rural life. The University of Massachusetts is the State Extension Service headquarters. Extension educational teaching plans are made in council with the people who determine their problems and help to suggest methods and practices for their solution.

The Extension effort was brought about by the Smith-Lever Law, passed by Congress on May 8, 1914. Since that time, the service has grown to a staff of over 100 State and County workers who conduct an educational program in all phases of agriculture and homemaking among the adults and young people (4-H Club work) of the State. All types of methods, including subject matter, meetings, demonstrations, farm and home visits, publications, visual aid, and radio are used in carrying out this educational program directly in the farm and rural areas of the State. During the war emergency, the Extension Service extended its home food production and preservation program to the urban areas.

ADMISSION

Applications for admission may be obtained by writing the Registrar of the University. Candidates are advised to file their applications early in the senior year and certainly not later than March 1 of the year they plan to enter.

Qualified applicants are admitted at the beginning of the fall and spring semesters and at the beginning of the ten weeks summer session. Since there are many more qualified applicants than can be admitted, however, preference has to be given to those with the highest ratings.

All applicants for admission except veterans and candidates for the Bachelor of Vocational Agriculture degree must take the Scholastic Aptitude Test given by the College Entrance Examination Board. In addition, the University reserves the right to require three Achievement Tests administered by the same Board if the applicant's scholastic record includes several subjects below the college recommending grade of the school. Each applicant will be informed of the procedure he must follow at the time his application is acknowledged.

Methods

A. *High School Seniors*

High school seniors are advised to file their applications early in the senior year. The Scholastic Aptitude Test may be taken on any of the scheduled dates. The January date is recommended except for those applying for early acceptance. The May date is usually too late for seniors, but is appropriate for juniors taking the test for guidance purposes.

Some applicants have a definite first preference for the University and have records that deserve early consideration. Such applicants will be accepted early in their senior year under the following conditions. They must be taking the usual college preparatory course in high school and maintaining the college recommending grade of the school in all of their courses. They must take the College Board Scholastic Aptitude Test in the junior year, preferably in May, and make a score satisfactory to the University. They must indicate the University as their first preference.

Under these conditions the University will be glad to accept such students as indication of excellent achievement in high school and to reduce some of the anxiety that an applicant feels during

the senior year while waiting for action usually taken in the spring. In this way, too, the burden of multiple applications on high school principals and college admissions officers may be lessened.

B. *High Ranking High School Juniors*

Applicants who have completed with very high academic standing work through the junior year may be admitted to the University for the semester following the junior year. Such applicants must take the Scholastic Aptitude and Three Achievement Tests given by the College Board in May of the junior year and make scores satisfactory to the University. They must be highly recommended by their high school principal. The maturity and social adjustment of the applicant will be considered along with his intellectual development. Such applicants should apply before the end of the junior year.

C. *Veterans*

Veterans are not required to take the Scholastic Aptitude Test. Instead, they must take entrance examinations in Algebra and English and a College Qualification Test. These are administered by the University Testing Service in January, June and August. Information in regard to these tests will be furnished the veteran at the time he files his application for admission. "Six Months Active Duty for Training" students are not considered veterans. They must take the College Board Scholastic Aptitude Test rather than the Veterans' Examinations.

D. *Bachelor of Vocational Agriculture Degree*

Superior graduates of Vocational Schools of Agriculture in Massachusetts and Vocational Agricultural Departments in Massachusetts High Schools may be accepted for the Degree of Bachelor of Vocational Agriculture, provided:

a. They are unqualifiedly recommended by the Vocational Division of the Department of Education as *bona fide* Vocational Graduates with superior ranks; and
b. That they can present at least 16 units of certified entrance credits, approved as to quality and quantity by the State Department of Vocational Education.

E. *Transfer*

A limited number of transfers from approved colleges may be admitted. Since applicants for such transfer exceed the number that can be admitted, they are placed on a competitive basis.

Ratings will be based upon high school and college records and on the College Board Scholastic Aptitude Test, which is required of all transfers. The University reserves the right to require the College Board Achievement Tests also, if the applicant's records make such advisable. Information in regard to transfer may be obtained by writing the Registrar.

At least 45 semester credits taken in residence at the University are required of all transfers who are candidates for the Bachelor's Degree.

Subject Requirements

The subjects of preparatory study required for admission call for the satisfactory completion of a four-year high school course or its equivalent and are stated in terms of units. A unit is the equivalent of at least four recitations a week for a school year. High school graduation alone is not sufficient. The applicant's record must indicate capacity for handling the quality of scholastic work which the University has established as its standard of achievement.

Sixteen units of secondary school work must be offered, selected according to the following requirements:

Algebra	1½
Plane Geometry	1
English	4
Foreign Language (2 years of 1 language)	2
U.S. History	1

The remaining units are elective and may be selected from the following subject matter:

a. Mathematics
b. Science
c. Foreign Language
d. History and Social Studies
e. Free electives (not more than four units)

Free elective subjects are those not included in groups a-d, as for example: Music, art, drawing, typewriting, aeronautics, agriculture, home economics, etc. Such free electives are allowed in order that the student who wishes may have some opportunity to elect other high school offerings, while at the same time covering the fundamental requirements for college work.

Students planning to pursue an engineering curriculum should offer two years of algebra, one of plane geometry, and one-half year each of trigonometry and solid geometry, chemistry and physics

are also advised. Those deficient in the mathematics should plan to cover it during the summer prior to entrance or expect to take five years to complete the college course.

In high schools organizing agricultural club work under the supervision and rules of the Junior Extension Service of the University, one credit is granted for each full year of work approved by state leaders.

Candidates of exceptional ability and promise may be considered for admission even though some of the prescribed courses were not included in their high school program.

Physical Examination

Physical examination by their local doctor is required of all entering freshmen, re-entering students and all students participating in athletics. Physical report forms for this examination will be mailed to each student with the bill for the first semester and must be completed and returned to the University Health Service 10 days before the opening of the semester. Evidence of a *successful* smallpox vaccination is required.

Veterans' Affairs

The Veterans' Coordinator is a member of the Placement Service.

Veterans enrolling for the first time must file a Certificate of Eligibility with the Placement Office prior to or at registration. All veterans should clear their affairs through the Placement Service.

EXPENSES

University Fees

Expenses vary from approximately $870 to $900 per year for the normally economical student. First year costs are usually greater than those of the other three years and there is less opportunity to earn. A student is advised to have a definite plan for meeting the expenses of the first year before entering.

Freshmen entering the School of Engineering should be prepared to meet an expense of approximately $35 for drawing equipment and a slide rule.

The following estimate of a year's expenses, based upon last year's costs, includes only those items which are strictly college and does not include amounts for clothing, laundry, travel, etc. These costs vary slightly from year to year. Tuition for residents of Massachusetts is $100 per year and for others $600.

	Normal
Tuition (citizens of Massachusetts)	$100.00
Room in college dormitory or private home (average)	180.00
Board at University Dining Hall	430.00
Books, stationery, and other supplies	100.00
Athletic Fee	20.00
Student Tax (approximate)	20.00
Student Union Fee	20.00
	$870.00

Initial Payment for Freshmen

The initial payment required of freshmen at the time of fall registration is indicated below and is made up of the following items:

Tuition (citizens of Massachusetts)	$50.00
Room rent (dormitory) approximately	90.00
Board (University Dining Commons)	165.00
Military Uniform (men students)	30.00
Physical Education Equipment Fee (men only)	10.00
Athletic Fee	10.00
Student Tax (approximate)	10.00
Books, Stationery, etc.	60.00
Student Union Fee	10.00
	$435.00

The above are only approximate figures. A bill will be rendered to the parent of each student prior to the opening of the University.

Tuition

As a state institution the University of Massachusetts offers a low rate of tuition to all students entering from the Commonwealth. Eligibility for admission under the low residential rate is determined in accordance with the following policy established by the Board of Trustees.

A student must present evidence satisfactory to the Treasurer of the University that his domicile is in the Commonwealth of Massachusetts in order to be considered eligible to register in the University as a resident student. This means that he must have established a *bona fide* residence in the Commonwealth with the intention of continuing to maintain it as such.

The domicile of a minor shall follow that of the parents unless such minor has been emancipated. In case of emancipation the student, in addition to the requirements of these regulations, respecting residence, shall present satisfactory proof respecting emancipation. Minors under guardianship shall be required to present, in addition to the certification of the domicile of the guardian, satisfactory documentary evidence of the appointment of the guardian.

No student shall be considered to have gained residence by reason of his attendance in the University nor shall a student lose residential preference during his continuous attendance at the University.

The residence of a wife shall follow that of the husband.

The prescribed form of application for classification as to residence status must be executed by each student. Misrepresentation of facts in order to evade the payment of out-of-state tuition shall be considered sufficient cause for suspension or permanent exclusion from the University.

Discretion to adjust individual cases within the spirit of these rules is lodged with the President of the University.

Board

The University provides three dining halls for students at Butterfield House, Greenough House and University Dining Commons. The dining halls at Butterfield and Greenough dormitories are intended primarily to provide for students housed in that area, including residents of Chadbourne, Mills and Brooks Houses.

All freshmen, sophomores and juniors residing in University Dormitories will be required to board at University Dining Halls,

except that such students who are members of fraternities or sororities are permitted to board at their respective fraternities or sororities.

Any student who wishes may board at University dining halls on the ticket plan or cash basis.

Military Uniform

All freshmen students taking military drill are required to make a deposit of $30 for the uniform at the time the first semester bill is paid. Charges for loss or damage of the government issued uniforms will be deducted from this deposit. Should the amount on deposit drop below $20, because of charges, the student will be required to make additional deposit to restore the balance to $30. The deposit will be refunded to the student less any charges after clearance from the Air Force or the Army after the student has completed the requirements of the basic course, has been excused from the course or has left the University.

Student Activity Tax

This tax, authorized by vote of the undergraduate students with the approval of the Board of Trustees, provides each student with the *Collegian,* the student newspaper; *Index,* University annual; Social Union privileges, student government, class and other activities.

PAYMENTS

Advanced Payment

New students will be expected to make an advance payment of $15 to the Treasurer of the University as soon as they are notified by the Registrar that they are accepted for admission. This will be considered as first payment on registration fee, which will be due at time of matriculation in September. It is not refundable and will be considered as payment for admissions and registration expense if the student does not matriculate.

A Certificate of Residence form furnished by the University must be properly filled out by the parent and the town or city clerk and returned with the $15 advance payment.

When Payments Are Due

In accordance with policy established by the Board of Trustees, all charges for tuition, fees, board, and room rent in University

Dormitories are due and payable seven days prior to the date of registration of each semester. Bills will be rendered in advance and payment may best be made by mail. Students may not register until registration charges are paid.

Late Payment and Registration

Any student who does not make payment of his semester charges within the time specified may be required to pay a fine of $5.00. Similarly, any student who does not report for registration on the dates specified or fails to complete his registration within the prescribed time may be required to pay a late registration fee of $5.00.

Tuition and Fee Refunds

A student who leaves the University for any reason except as specified below before a semester is completed will be granted a refund of tuition and fees in accordance with the following schedule:

Regular Term

a. Within the first two weeks from the beginning of semester or term—80%
b. During the third week—60%
c. During the fourth week—40%
d. During the fifth week—20%
e. After the fifth week—no refund

Summer Session

a. During the first week—60%
b. During the second week—20%
c. After the second week—no refund

A student who makes an advance payment and then for any reason does not attend any part of the next semester or term at the University will be given a full refund of tuition and fees. The $15 advance payment fee required of new students is not refundable.

A student who is involuntarily called into military service before the completion of a semester will be given a pro rata refund of tuition and fees provided that he receives no academic credit for the work of that semester. If academic credit is given, there will be no refund.

A student who is suspended or expelled from the University for disciplinary reasons forfeits all rights to a refund.

Room Rent Refunds

It is the policy of the University that there will be no refund of prepaid room rent after the semester has commenced except in the case of a student who is involuntarily called to military service who will be granted a refund on a pro rata basis.

A student who has made an advance payment of room rent who fails to attend any part of the next semester or term or does not reside in a dormitory or other housing will be granted a full refund of prepaid room rent.

Board Refunds

Prepaid board will be refunded on a pro rata basis.

Veterans' Information

Veterans who are entering the University for the first time under the old G.I. Bill (P.L. 346) must present a Certificate of Eligibility at registration. This may be obtained from your nearest Veterans Administration office. Veterans failing to obtain the Certificate of Eligibility must make payment of tuition and fees in order to register. Board and room fees must be paid in advance whether enrolled under the G.I. Bill or not.

Veterans (under P.L. 346) who are transferring to the University of Massachusetts from another institution or who have done summer work at another institution will be required to submit a supplemental Certificate of Eligibility at registration. This may be obtained by applying through the veterans' office at the institution last attended.

Veterans entering under the new G.I. Bill (P.L. 550) must meet all expenses personally. Presentation of a Certificate of Eligibility should insure the receipt of subsistence checks from the Veterans Administration.

FINANCIAL AID

Scholarships, loans, and part-time employment are available for a limited number of needy and deserving students.

Aid for Freshman Year

Freshmen are eligible for scholarships and part-time employment. A freshman also becomes eligible for assistance from loan funds after satisfactorily completing one semester of academic

work. Scholarship application blanks may be secured from the Registrar and should be filed by March 15. Part-time employment application forms may be obtained from the Director of Placement Service and filed after a candidate has been accepted for admission.

Because of the time required for preparation of studies, few students should plan to spend more than ten hours per week in part-time employment.

Aid for Upperclassmen

To become eligible for financial assistance or part-time employment, students must file completed financial aid application forms with the Student Aid Committee in the Placement Service office by June 1 previous to the college year for which assistance is asked.

Aid for Graduates of the University

The Lotta M. Crabtree Agricultural Funds make available to graduates of the University of Massachusetts funds to be used for farm financing.

The purpose of loans from these funds is to assist meritorious graduates who are without means in establishing themselves in agricultural pursuits. These loans are made without interest or service charges other than the cost of title search and legal papers. They must, however, be paid back in full amount within a reasonable length of time and there are certain restrictions on their use.

Applications for the "Lotta Agricultural Fund" should be addressed to the Trustees of the Lotta M. Crabtree Estate, 619 Washington Street, Boston, Massachusetts, or may be secured at the Placement Office at the University. Decisions regarding the granting of a loan rest entirely with the Trustees under the terms of Miss Crabtree's will.

SCHOLARSHIPS, LOANS, HONORS, AWARDS

Scholarships are awarded only to needy and deserving students of high character whose habits of life are economical and whose scholastic records are satisfactory. A limited number of these scholarships are available for entering freshmen.

Scholarships are paid in installments at the beginning of each semester in the form of a credit on the student's bill. A scholarship may be discontinued at the close of any semester.

If the scholarship student withdraws from the University, any refund of University fees or charges must first be applied to reimburse the scholarship fund for the full amount of the scholarship received by the student for the semester.

Applications for scholarships may be obtained from Fred P. Jeffrey, Stockbridge Hall, and must be completed and returned by March 15 to be considered.

GENERAL SCHOLARSHIPS

Commonwealth Scholarships. The Commonwealth of Massachusetts annually provides 25 scholarships of not more than $250 for members of each of the four undergraduate classes of the University. Upperclass students may obtain application forms from Fred P. Jeffrey, Stockbridge Hall. Entering freshmen may obtain application forms at the Registrar's Office.

Lucius Clapp Fund to provide scholarships and loans to deserving students.

Henry Gassett Scholarship for a worthy undergraduate student.

Charles A. Gleason Scholarships. General scholarship for worthy students.

Whiting Street Scholarship. Scholarships of $50 each for deserving students.

George H. Barber Awards. A limited number of grants-in-aid awarded on the basis of leadership, good citizenship, need or high scholarship.

Danforth Keyes Bangs Scholarship for the aid of industrious and deserving students.

The Alpha Sigma Phi Scholarship for needy students.

University Scholarships. Scholarships ranging in value from $50 to $500 awarded to needy scholars in all the colleges, schools, and divisions except Agriculture.

University Foundation Scholarships. A limited number awarded to needy scholars.

Foreign Student Scholarships. A limited number of scholarships, involving waiver of tuition fees only, awarded on the basis of merit and need. Applications should be addressed to the Adviser to Foreign Students.

RESTRICTED SCHOLARSHIPS

Area Scholarships

Frederick G. Crane Scholarships for the aid of worthy undergraduate students, preference given to residents of Berkshire County.

Boston Alumni Club Scholarship. A limited number of scholarships awarded on the basis of leadership, need, scholarship and participation in extra-curricular activities. Available to incoming freshmen from Greater Boston.

Betsey C. Pinkerton Scholarships. Two general scholarships for graduates of the schools of the city of Worcester.

Wilbur H. H. Ward Scholarships. Twenty-five scholarships of approximately $100, known as the Wilbur H. H. Ward Scholarships. The Wilbur H. H. Ward Fund is administered by a Board of Trustees independent of the University. Applicants for these scholarships write to Sumner R. Parker, 1 Sunset Court, Amherst. They are available to Hampshire County Men.

Class Eligibility Scholarship

Class of 1882 Scholarship for the aid of a worthy student of the junior or senior class.

College of Agriculture

Alvord. For students specializing in the study of dairy husbandry or dairy manufacturing with the intention of becoming an investigator, teacher, or special practitioner in the dairy industry. Restricted to students who do not use tobacco or fermented beverages.

SCHOLARSHIPS

O. G. Anderson Memorial Fund. For needy and worthy students majoring in pomology. To be used for the purchase of books and supplies. Granted only on the recommendation of the Department of Pomology.

Ascension Farm. For men students in the College of Agriculture. Residents of Berkshire County have preference, but awards may be made to students from Hampshire, Hampden, and Franklin Counties.

Borden. One scholarship of $300 to be awarded to a senior in the College of Agriculture who has the highest scholarship average in all work through the Junior year and who has completed two or more courses in dairying.

Boston Market Gardeners' Association. A $100 scholarship for a Sophomore in agriculture. Applications should be made to the Secretary of the Boston Market Gardeners' Association, 240 Beaver Street, Waltham 54, Mass.

Buttrick. For junior, senior or graduate students majoring in Dairy Industry or Food Technology. Scholarships will range from $100 to $500 per year depending upon scholarship achievement and need.

Charles M. Cox Trust Fund Scholarship of $300 is awarded to a student or students in the College of Agriculture on the basis of need, character and scholarship ability. Preferably the scholarships will be awarded to undergraduate majors in dairy husbandry or poultry husbandry.

Lotta Crabtree. For students in the College of Agriculture. Based on scholarship and need.

Massachusetts Flower Growers' Association Scholarships. Two $200 scholarships awarded to qualified juniors or seniors majoring in Floriculture.

Esso. Scholarships are based on membership in 4-H Club, and applications should be sent to County 4-H Club Agents. Scholarship is for $400 ($100 per year) for students enrolled in courses of agriculture.

J. W. D. French Fund. For students in dairy and forestry, and allied subjects.

Charles H. Hood Foundation. Awarded to two juniors and two seniors in the College of Agriculture, with preference given to those studying the production of milk. Based on scholastic standing, character, industry, and personality.

MARGARET MOTLEY. For a woman student majoring in Floriculture or Landscape Gardening. Need, scholarship, and promise of success from the basis of the award which is provided by the Garden Club Federation of Massachusetts, Inc.

PORTER L. NEWTON. For students majoring in Agriculture who are residents of Middlesex County.

FRANK H. PLUMB. For students majoring in the College of Agriculture.

V. A. RICE SCHOLARSHIP FUND. A $100 scholarship for a worthy student majoring in Animal Husbandry.

SEARS-ROEBUCK FOUNDATION. Four scholarships for outstanding freshman in the College of Agriculture, based on scholarship, leadership, personality, business ability, or special achievement. The outstanding freshman recipient is eligible for a special sophomore scholarship.

SPRINGFIELD GARDEN CLUB. For students living in the vicinity of Springfield, Mass. and majoring in some phase of Horticulture.

ELLSWORTH MILTON STATLER FOUNDATION SCHOLARSHIPS. Two $500 scholarships for students majoring in Hotel and Food Management. Students must be recommended by the University Scholarship Committee and approved by a Committee of the Statler Foundation. These scholarships may be awarded to either four year or Stockbridge students.

School of Engineering

Alumni Scholarships

Provided by annual contributions from graduates and friends of the School of Engineering to provide tuition scholarships to deserving and well-qualified students pursuing work in a major field of engineering. They are available to freshmen and upperclassmen.

KOLLMORGEN OPTICAL CORPORATION TUITION SCHOLARSHIP awarded annually to a junior or senior student majoring in Mechanical Engineering. Awarded on the basis of need and superior scholastic attainment.

WESTINGHOUSE EAST SPRINGFIELD ENGINEERING SCHOLARSHIPS of $250 each awarded annually to a member of each class majoring in electrical or mechanical engineering. Selection made on the basis of high scholastic achievement and need.

Military Scholarships

United States Army ROTC Scholarship. The U.S. Army Reserve Officers Training Corps, in conjunction with the Division of Physical Education, offers a scholarship of $150 to a sophomore male student. This scholarship is solely for tuition and fees and may be renewed for two additional years. It is awarded to ROTC students who possess leadership qualities and can meet the physical requirements for commission as a second lieutenant in the Army Reserve, have a good scholastic record, and agree to apply for the advanced course, Armor ROTC.

United States Air Force ROTC Scholarships. The U.S. Air Force Reserve Officers Training Corps in conjunction with the Department of Physical Education offers two scholarships of $150 each to two sophomore men students. These scholarships are solely for tuition and fees may be renewed for three additional years. They are awarded to students who possess leadership qualities, meet the physical standards required for commissions in Air Force Reserve, have a good scholastic record in secondary school and agree to enroll in the basic course, Air Force ROTC, and to apply for the advanced course, Air Force ROTC.

College of Arts and Sciences

Stephen Davis Scholarship. Awarded jointly by the Dean of the College of Arts and Sciences and the head of the Division of Physical Education to a male undergraduate majoring in liberal arts or social sciences who also participates in the athletic program. The value of this scholarship is approximately $800 per year.

School of Home Economics

Minnie R. Dwight Scholarship. For a student majoring in Home Economics who is a resident of Hampden County. This scholarship is for $400—$50 each semester for four years if scholarship is maintained.

Mrs. Clifton Johnson Scholarship. For a Home Economics student, perferably a junior or senior, who is a resident of Hampshire County, and who has indicated an interest in Extension work as a career.

Helen Knowlton Scholarships. For deserving students majoring in home economics.

Massachusetts Home Demonstration Scholarship. For a junior or senior home economics student, preferably one who has indicated an interest in Extension work..

Sears Roebuck Scholarships. For four freshmen students entering the School of Home Economics from small town or rural high schools, and preferably those who have indicated an interest in Extension work.

Edna L. Skinner Scholarships. For junior or senior students majoring in home economics.

Helen A. Whittier Scholarship. For one or two senior home economics students selected on basis of scholarship, need and character.

4-H Scholarships

Cotting Memorial Scholarship. All college expenses of freshman year—for a woman student. Recipient of this scholarship is selected by a committee of the New England Branch of the Farm and Garden Association from among candidates proposed by State Leaders of 4-H Club work in the New England states.

George L. Farley Scholarships. The Massachusetts Society for Promoting Agriculture has established a scholarship in memory of George L. Farley. The income of approximately $60 per semester is awarded to deserving 4-H Club members, men or women, recommended by the State Leader of 4-H Clubs from applications submitted by County 4-H Club Agents.

Scholarships for Women Students Only

Chi Omega Award. The local chapter of the Chi Omega Sorority offers an annual scholarship of $25 to a woman student majoring in the department of economics or psychology who has the highest scholastic average at the end of the first semester of the senior year.

The Mortar Board Award. An award by Mortar Board, the senior women's honor society, to a woman student at the end of her junior year. This award is made on the basis of character and personality, scholastic achievement, campus influence and service.

Polish Junior League Scholarship. An award by the Polish Junior League to a woman student of Polish decent, at the end

of her junior year, paying full tuition for the senior year. The basis of this award is character and scholastic achievement.

LOANS

Through the generosity of friends of the University, funds have been donated to provide loans for a limited number of students of the three upper classes to assist in paying tuition or other college expenses. These loans are granted, after proper consideration, to needy students of good scholarship whose habits are economical. All loans are secured by a note endorsed by a responsible party as collateral. All such loans must be paid before graduation. Upon withdrawal from the University, loans automatically become due. Interest is charged at the rate of 3% to maturity, 5% thereafter on loans from all funds except the Lotta Agricultural Fund, from which loans are made without interest. Application for loans should be made to the Student Aid Committee, Placement Service Office, South College. No loan will be granted in excess of $200 in any one year.

If funds are available at the beginning of the second semester, loans may be made in exceptional cases to members of the freshman class whose scholastic record is satisfactory and whose budget calculations have been upset through circumstances beyond their control.

Danforth Keyes Bangs Fund. This is a gift of $6,000 from Louisa A. Baker of Amherst, the income of which is used in aiding poor, industrious and deserving students to obtain an education at the University of Massachusetts.

Lotta Crabtree Agricultural Fund. A limited number of loans are made to students from the income of this fund. Such loans are made without interest but only to deserving students of high scholastic rank. This fund is administered by a Board of Trustees independent of the University although loans are made only upon the recommendation of the President of the University.

Vincent Goldthwait Memorial Loan Fund. A gift of $5,000 from Dr. Joel E. Goldthwait in memory of his son. This fund is used almost entirely for students in the Stockbridge School of Agriculture.

Frank A. Waugh Foundation. Graduates of the Department of Landscape Architecture and friends of Professor Frank Waugh have established this fund, to be used in part for loans to deserving seniors and fifth year students of that department. Requests for loans shall be reviewed and approved by the head of

the Department of Landscape Architecture and submitted to the Board of Trustees of the Foundation, who shall make final decision as to granting of the loans and amounts thereof.

4-H Scholarship and Loan Fund. This fund is under the supervision of the State Leader of the 4-H Clubs and is used to aid students preparing for agricultural and home economics service.

National Pest Control Association Loan Fund. A fund established by the National Pest Control Association for needy students in the field of Entomology.

HONORS, PRIZES, AWARDS

Scholarship Honors

Departmental Honors. A student who has shown outstanding promise within some department and has maintained a general scholastic average of B or better is permitted to apply for the privilege of registering for departmental honors. If his application is accepted by his department and the Honors Committee, he is allowed to pursue a course of independent study within the department of his choice throughout his senior year. This may include intensive reading, investigation or laboratory work in connection with some problem that he chooses for his consideration. The objective is to create initiative power of independent investigation and to develop the spirit of research. Although the student is responsible for his undertaking he is encouraged to consult with his department in regard to his work should the need arise. At the close of his study the student presents a thesis covering his investigation. In addition he may be required to appear for an oral or written examination. If by the excellence of his work he satisfies all the requirements of his department and the Honors Committee, his name will appear on the commencement program as receiving honors in the field of his specialization.

Scholastic Prizes

Phi Kappa Phi Awards for Scholarship. The University of Massachusetts chapter of Phi Kappa Phi, national all-university scholastic honor society, annually presents awards of from $10 to $60 to the outstanding scholar or scholars of each of the three upper classes. These awards, based upon cumulative scholastic averages and character, are presented at the opening convocation in the fall.

The Burnham Prizes. These were made possible through the generosity of Mr. T. O. H. P. Burnham of Boston. Prizes of $25 and $15 are awarded through the Department of Speech to those students delivering the best and second best declamations in the Burnham Contest. Preliminary contests are open under certain conditions to freshmen and sophomores.

The Flint Prizes. The Flint Speaking Contest was established in 1881 by a gift of the late Charles L. Flint, a former president of the University. After his death the prizes were continued by college appropriation. Awards of $25 and $15 are presented through the Department of Speech as first and second prizes respectively to those two upperclassmen delivering the best extemporaneous speeches in the contest.

The Hills Botanical Prize. This is given through the generosity of Henry F. and Leonard M. Hills of Amherst, for the first and second best herbaria. Competition is open to members of the senior, junior and sophomores classes. First prize is $20, second prize $15.

The Betty Steinbugler Prize in English. This prize was endowed by John L. Steinbugler, New York City, in honor of his daughter Elizabeth Steinbugler Robertson, a graduate of this University in 1929. It is awarded to a woman in the junior or senior class who has written the best long paper on a subject of literary investigation in a course in English during the year.

Massachusetts Society for Promoting Agriculture Prizes. Three prizes of $25, $15, and $10 are awarded to those senior students who are judged to have made the best records in the theoretical and practical work in agriculture required in their course of study, and in the special written and oral examination prepared for this award.

The L. R. Wilson Award in Geology. This award, named in honor of the former head of the Geology Department, is conferred on the graduating senior with an outstanding academic record as a major in geology.

Athletic Awards

The Allan Leon Pond Memorial Medal. This medal is awarded for general excellence in football in memory of Allan Leon Pond of the class of 1920, who died February 26, 1920. He is described as "A congenial companion, a devoted lover of Alma Mater, a veteran of World War I, a fine all-round athlete and a true

amateur. He would rather win than lose, but he would rather play fair than win." He has been characterized as a typical student of the University.

The William T. Evans Memorial Trophy. This trophy is given each year to that member of the varsity football team who through his sportsmanship, football ability, character and personality, has exemplified the character and spirit of the person in whose memory this memorial trophy is dedicated. The trophy is dedicated to the memory of William T. Evans, a former member of the class of 1942, who died December 9, 1941. This trophy is presented annually by the class of 1942.

The Thomas E. Minkstein Memorial Award. This award is made by the class of 1931 in memory of their classmate who died July 16, 1930 while he was captain-elect of football. The award is given to one of the outstanding men in the junior class who has as nearly as possible attained those standards of athletics, scholarship and leadership set by him whose memory this award honors.

The George Henry Richards Memorial Cup. This cup is awarded annually to the member of the basketball team who shows the greatest improvement in leadership, sportsmanship, and individual and team play during the year. It is in memory of George Henry Richards of the Class of 1921 who died suddenly while a student at the College.

Stephen Davis Scholarship. Established by gift of Mr. and Mrs. Benjamin Davis of New York City in memory of their son, Stephen Davis, class of 1954, who lost his life while serving as an officer with the United States Air Force. For a male undergraduate majoring in Liberal Arts or Social Sciences who also participated in the athletic program. The selection of the recipient is made jointly by the Dean of the College of Arts and Sciences and by the Head of the Division of Physical Education. The student selected receives each year not to exceed four years the full income from the fund so long as he remains in good standing in the University and continues to major in Liberal Arts or the Social Sciences. Annual income is approximately $800.

The Joseph Lojko Memorial Plaque. This plaque is presented to a senior who must be a letter man, have a satisfactory scholastic record and show those qualities of enthusiasm and cooperation which make for leadership. It is awarded in honor of Joseph Lojko of the Class of 1934, outstanding athlete who died while a senior in the College.

The Samuel B. Samuels Basketball Cup. This cup is presented annually in the name of Samuel B. Samuels of the Class of 1925 who was an outstanding basketball player during the early years of basketball as a varsity sport at the University. The trophy is awarded to that letter man who is a regular member of the varsity team and who has performed with excellence during scheduled varsity games.

The E. Joseph Thompson Memorial Trophy. This baseball trophy is given by Thomas Thompson in memory of his brother, E. Joseph Thompson who graduated from Massachusetts State College in 1932. He was president of the Student Senate, a varsity letter man in football and baseball, and an outstanding campus citizen. The award goes to that member of the varsity baseball team who best exemplifies the most admirable characteristics of the sport each year.

Varsity Club Track Plaque. This plaque is presented by the Alumni Varsity M Club each year at its Commencement meeting to that member of the track team who is considered to have been the most valuable member of the team during the past season.

Paul Sears Putnam Memorial Tennis Trophy. This trophy is awarded to that member of the varsity tennis team who has displayed by his conscientious endeavor, clean play, good sportsmanship and all-around ability as an athlete and scholar, that he is a credit to his team and University, and shall have his name inscribed on the trophy. He shall also be presented with a suitable medal or watch charm. The trophy is established in memory of Paul Sears Putnam, '38, by the members of his family, in the hope that it will stimulate and encourage students to emulate his characteristics of whole-hearted enthusiasm and good sportsmanship, true cooperation and the constant endeavor to always give to the best of their ability in any project they may undertake.

Maurice Suher Soccer Plaque. This trophy is to be awarded annually to that letterman of the varsity team who is deemed to have been the most valuable member of the team. It is presented to the University by Maurice Suher of the class of 1930. Maurice was one of the two students largely instrumental in having soccer recognized as a varsity sport at the University. He played on the first varsity soccer team at the U. of M., in the fall of 1929.

Chester F. Bowen Jr. Memorial Award. The class of 1949 presented the Chester F. Bowen Jr. Memorial Award in track and cross-country to the University as its class gift. Members of the class felt that this gift would be the most appropriate which

they could give the University, since it would be a fitting memorial to a former classmate and a worthy award for the outstanding athlete in varsity track and cross-country.

Varsity Club Hockey Plaque. This plaque shall be awarded annually at the Commencement meeting of the Varsity Club, to that member of the hockey team who is considered to have been the most valuable player to the team.

Samuel S. Crossman Memorial Trophy. This award is made to the member of the senior class who must have received two varsity awards, had an above average academic record, and possessed qualities of enthusiasm, cooperation, leadership, and be recognized as the outstanding student-athlete on the campus. The trophy was established by the University Athletic Council. The award is dedicated to the memory of Samuel S. Crossman and consists of a trophy upon which the name of the student chosen is to be inscribed. A small replica will be presented for his permanent possession.

MILITARY HONORS AND AWARDS

Leadership, scholarship, and proficiency in the work of the military department are recognized by honors and awards announced at the Annual Federal Inspection in May.

United States Army Reserve Officers Training Corps, Armor Branch

Distinguished Military Students. Each year the Professor of Military Service and Tactics designates as distinguished military students those members of the first year advanced course who possess outstanding qualities of leadership, high moral character, and a definite aptitude for the military service. Students who are so designated must possess an academic standing in the upper half of their class or in the upper ten per cent of their class in military subjects. All distinguished military students are authorized to wear the distinguished military student badge.

Distinguished Military Graduates. Each year the Professor of Military Science and Tactics designates as distinguished military graduates those members of the graduating class who were previously designated as distinguished military students and have maintained the same high standards required for such designation and have successfully completed training at the Reserve Officers' Training Camp.

The Military Order of the Loyal Legion Trophy. Awarded annually by the Military Order of the Loyal Legion to the senior armor cadet ranking first in military scholarship and proficiency. Winner's name is engraved on a plaque and a sterling silver goblet, appropriately engraved, is given to the individual to keep in his permanent possession.

The U.S. Armor Association Scroll. Awarded annually by the U. S. Armor Association to the outstanding Armor cadet graduating from the senior ROTC class. An engraved scroll bearing the name of the winner is presented to the winning cadet to keep in his personal possession.

Armed Forces Communications Association Honor Award. Awarded annually by the Armed Forces Communications Association to the outstanding senior ROTC cadet majoring in electrical engineering. The winner is presented with an appropriately engraved gold medal and scroll.

Military Science Faculty Award. Awarded annually by the Military Science faculty to the Cadet Colonel of the Armored Combat Command for outstanding leadership. The winner is presented a complete set of officers insignia.

The Reserve Officers Association Medal. Awarded annually by the Reserve Officers Association of the United States, Massachusetts Department, to the Junior Armor cadet who is outstanding in military proficiency. The winner's name is engraved on a plaque and a medal, appropriately engraved, is given to the individual to keep in his personal possession.

The Elizabeth L. McNamara Trophy. Awarded annually by Mrs. Elizabeth L. McNamara, a former trustee of the University of Massachusetts for many years, to the Armor cadet ranking first in scholarship in the second year basic course. The winner's name is engraved on a plaque and a sterling silver goblet, appropriately engraved, is given to the individual to keep in his permanent possession.

The Military Science Trophy. Awarded annually by the Department of Military Science, University of Massachusetts, to the Armor cadet ranking first in the second year basic course. The winner's name is engraved on a sterling silver goblet which is given to the individual to keep in his permanent possession.

The Amherst Rotary Club Trophy. Awarded annually by the Amherst Rotary Club to the Armor cadet ranking first in scholarship in the first year basic course. The winner's name is en-

graved on a plaque and a sterling silver goblet, appropriately engraved, is presented to the winner to keep in his personal possession.

The Military Science Award. Awarded annually by the Department of Military Science, University of Massachusetts, to the Armor cadet ranking first in military proficiency in the first year basic course. The winner's name is engraved on a gold medal which is presented to him.

Department of the Army Awards. The Department of the Army awards annually the Superior Cadet Ribbon with certificate and lapel device, to one outstanding student in each academic class. The winner of the award must be in the upper one fourth of his academic class and be selected by the PMST and Dean of Men.

Rifle Team Award. Awarded annually by the Varsity Rifle Team, University of Massachusetts, to the team member who fires the highest cumulative match score for the season. The winner's name is engraved on a gold cup which is presented to him to keep in his personal possession.

United States Air Force Reserve Officers Training Corps

Distinguished Military Student. Each year the Professor of Air Science and Tactics will select from the students who are completing the second year advanced course, AFROTC, those who possess outstanding qualities of character, leadership, and a definite aptitude for the military service for designation as Distinguished Military Students.

Distinguished Military Graduate. Each year the Professor of Air Science and Tactics will designate the distinguished Military Graduates from those Distinguished Military Students who have completed the advanced course, AFROTC, and who will receive their baccalaureate degree. The Distinguished Military Graduates, with their consent, may compete for a regular Air Force Commission after serving on active duty for eighteen months.

Air Science Trophy. Awarded annually by the Department of Air Science to the Air Science freshman cadet most outstanding in Military and Academic Scholarship. The trophy is a silver cup appropriately engraved which is given to the winner.

Sons of American Revolution Medal. Awarded annually by the Sons of the American Revolution to an Air Science sophomore cadet selected for leadership, soldierly bearing and general ex-

cellence. The winner's name is engraved on a medal which is presented to the individual.

Amherst Post American Legion Trophy. Awarded annually by the Amherst Post American Legion to the Air Science sophomore cadet who has demonstrated the most outstanding abilities in Military Drill and Scholarship. The trophy is an engraved silver cup.

Air Cadet Squadron Trophy. Awarded annually by the Air Cadet Squadron to an Air Science sophomore cadet who has been an outstanding member of the Air Cadet Squadron and Drill Team. A silver cup appropriately engraved with the individual's name is presented to the winner.

Air Science Trophy. Awarded annually by the Department of Air Science to the Air Science junior cadet who has displayed outstanding military proficiency and maintained a high scholastic standing. A silver cup engraved with the individual's name is presented to the winner.

Air Force Association Medal. Awarded by the Air Force Association to the most outstanding Air Science junior cadet. The award is an engraved medal which is presented to the winner.

Reserve Officers Association Medal. Awarded by the Massachusetts Reserve Officers Association to the graduating Air Force cadet who has been outstanding in Scholarship and Military Proficiency. The award is a medal engraved, which is presented to the winner.

Northampton Benevolent Protective Order of Elks Trophy. Awarded annually by the Northampton Lodge, BPOE, to the Air Science senior who by his zeal, effort and initiative has contributed most to the Corps of Air Cadets. The trophy is a engraved silver cup which is presented to the winner.

Daniel Fungaroli Trophy. Awarded annually by Mr. Daniel Fungaroli to the Air Science senior cadet who has been most outstanding at Summer Camp. The trophy is a silver cup engraved, which is presented to the winner.

Air Science Trophy. Awarded by the Department of Air Science annually to the graduating Air Science senior cadet who has demonstrated superior qualities of Leadership, Military Bearing and Scholarship. The trophy is a silver cup engraved, which is presented to the winner.

UNIVERSITY REGULATIONS

Standards of Deportment

The customary high standard of college men and women in honor, self-respect, and consideration for the rights of others constitutes the ideal of student deportment.

The privileges of the University may be withdrawn from any student at any time if such action is deemed advisable.

It should be understood that the University, acting through its president or any administrative officer designated by him, distinctly reserves the right, not only to suspend or dismiss students, but also to name conditions under which they may remain in the institution.

Hazing in the sense of the punishment or humiliation of students is not permitted.

Registration

Every student must report for registration on the appointed day. All late registrants must pay a $5 fine. No student will be admitted to any class until he has completed the prescribed registration procedure. Changes of courses on the registration card shall be made only by the Registrar's Office.

Any student who does not complete his registration, including payment of semester charges, on the regular registration days will be required to pay a fine of $5.

No course will be recorded on the permanent records of the University nor will a student receive credit for it, unless such course appears on the registration card for the semester and has been properly countersigned by the instructor.

Freshman Week

All members of the incoming freshman class are required to be in residence on the campus for the period known as Freshman Week. During this period an attempt will be made to orient the student. He will be given psychological tests; in addition there will be lectures on student activities, customs, and curricula, and a scheduled meeting with the student's adviser.

GRADING SYSTEM

Graduation from the University involves the elements of both quality and quantity of work. The mere accumulation of credits earned with D grades will not suffice for the degree. In addition to completing the semester hours required for graduation, a student must have made a quality point average of 2.0 or higher.

I. Grades

Grades shall be reported according to the following letter system. No other interpretation of this letter system shall be authorized.

A — Excellent
B — Good
C — Average
D — Passing (but not satisfactory)
F — Failure
Inc — Incomplete

The grade of Incomplete shall be reported:

A. When a portion of the assigned or required class work has not been completed because of necessary absence of the student, or other reasons equally satisfactory to the instructor. And then only when he considers the work already done to be of passing quality.

B. When because of serious illness or other cause beyond the control of the student, he is unable to take the final examination. In this case an *Incomplete* is to be given only if the instructor judges that the quality of the student's work is such that by satisfactory performance in the examination he could complete the work of the course with a passing grade. If the student's record is such that he would fail the course regardless of the result of the examination, he is to be given a failure.

A student can obtain credit for an *Incomplete* only by finishing the work of the course before the end of the fourth week of his next semester. A mark of *Incomplete* will be automatically converted to a failure if the course requirement has not been satisfied by this time. The initiative in arranging for the removal of the *Incomplete* rests with the student.

II. Quality Points

A. Quality points per semester hour will be assigned as follows: A, 4; B, 3; C, 2; D, 1; F, 0.

B. *Semester Grade Point Average.* To compute the semester grade point average, the total points earned will be divided by the total credits carried. Credits carried are defined as total credits earned and failed. Grade point averages will be recorded to one decimal place. For example, averages from 2.65 to 2.74 will be recorded as 2.7. At the end of the senior year, the cumulative average will be recorded to two decimal places. A student with an Inc. will not have his semester quality point average computed until these marks have been converted to letters except in those cases where obvious dismissal would be involved regardless of the *Incomplete.*

C. *Cumulative Average.* To compute the cumulative grade point average, the total points earned will be divided by total credits carried. Total credits carried will be the sum of the total credits earned and failed. A course once passed cannot be repeated for a higher grade.

D. In computing grade point averages the following will not be included:

1. Required physical education courses of the freshman and sophomore years.
2. Courses for which a student does not receive credit toward a college degree (Mathematics or Foreign Language to satisfy an entrance deficiency).

E. Only grades earned at the University will be included in computing the Cumulative Quality Point Average.

F. *Warning.* Any student whose semester quality point average falls below the cumulative quality point average requirement of his class will be warned of his status by the Registrar and informed of the rules governing dismissal. A copy will be sent to his parent.

III. Dismissal

Dismissal from the University for scholastic reasons shall be based upon regulations to be administered by the Committee on Admissions and Records. Changes in these regulations may be made by the Educational Policies Council and the University faculty.

IV. Honors

A. *University Honors Groups.* At the beginning of each semester a list is posted of those students who, during the previous

semester, made a semester grade point average of 3.0 or higher. Three groups are recognized as follows:

First Honors	3.8 or higher
Second Honors	3.4 to 3.7 inclusive
Third Honors	3.0 to 3.3 inclusive

B. *Graduation with Distinction.* High ranking students will be graduated as follows:

Summa Cum Laude—Cumulative average 3.8 or higher.
Magna Cum Laude—Cumulative average 3.4-3.7 inclusive.
Cum Laude—Cumulative average 3.0-3.3 inclusive.

A transfer, to be eligible for consideration for graduation with distinction, must have earned his final 60 semester hours of credit in residence at the University.

V. Changes in Registration—Adding and Dropping Courses

A. No course will be recorded on the permanent records of the University nor will a student receive credit for it unless he has registered for such a course in accordance with established procedure on a regularly scheduled registration day or unless his registration shall have been made official by the signature of the Registrar. In the latter case a Program Change Card must be signed by the student's Adviser and the Registrar approving the course. No instructor should allow a student to enter his class unless the student was officially enrolled on a regularly scheduled registration day or submits such a Program Change Card authorizing his admission to the class.

A student may not drop a course without the approval of his Adviser and the Registrar on a Program Change Card. A course dropped without this approval will be recorded as a Failure.

B. No new course can be added to a student's program after ten calendar days from the first scheduled day of classes of each semester.

The normal time for dropping a course without a failure will be established and recorded on the official University Calendar by the selection of the nearest practicable date which will allow three weeks from the first scheduled day of classes of each semester. The selection of this date will be the responsibility of the Provost.

C. A course dropped after the date regularly established on the University Calendar will receive a mark of WF (withdrew failing). This grade will be computed in the quality point average. If a student presents a valid reason from his Adviser

for dropping a course after the established date together with a statement from his instructor certifying that he is passing, and it is so recorded on a program change card, the course may be dropped with the mark WP (withdrew passing). The WP is not computed in the quality point average.

D. In case of voluntary withdrawal from the University after the mid-semester report the rules for WF and WP will apply to the entire course program of the student.

Change of Major

A student wishing to change his major must get a Program Change Card at the Registrar's Office. This change is to be approved by the head of the Department or School in which he is now majoring and also by his new major adviser. This card, properly indorsed, must be returned to the Registrar's Office before the change receives final approval.

Graduation Requirements

At the beginning of his freshman year each student selects a school or division in which he will carry his major work. One of the fundamental objectives of all programs, however, regardless of School, is a general cultural education which should be the mark of every college graduate.

With this end in view all candidates for the B.S. or B.A. degree must take certain required courses: English 1, 2, 25, 26; Speech 3 and 4; two social sciences to be selected from Economics 25, Psychology 26, and Sociology 25, and twelve semester hours of science. In addition, at least three hours must be elected from one of the following: History 5, 6, 59, 60, or Government 25.

The requirements in physical education must also be satisfied. All physically fit men students must take Military 1, 2, 25, and 26.

Since the work of the first two years is directed toward a broad, general education as a foundation for the more specialized training of juniors and seniors, it follows that the program of studies for all schools is fairly uniform up to the junior year. Because of this, students can readily change from one curriculum to another or even from one school to another as both freshmen and sophomores.

The minimum requirement for graduation is 60 junior-senior credits in addition to the satisfactory completion of the required and elective work of the first two years. Except upon special permission from the Provost or Registrar, no junior or senior shall enroll for more than 17 or less than 14 credits each semester.

During the junior and senior years, each student shall complete not less than 15, and not more than 30 credits in junior-senior courses in the department in which he is specializing.

It is the policy of the University that the final 45 semester hours of scholastic work be taken in residence. Residence, for this purpose, is defined as a period of continuous enrollment and regular attendance in classes conducted on the campus of the University.

Financial Requirements for Graduation

Diplomas, transcripts of record, and letters of honorable dismissal will be withheld from all students who have not paid all bills and all loans due the University. All such bills due the University must be paid ten days preceding Commencement. If paid after that date and the student is otherwise eligible, he may graduate the following year.

Transcripts

Two transcripts of a student's record will be furnished without cost. For each additional copy there will be a charge of $1.

Student Housing

It is the policy of the Board of Trustees that all men and women students shall be housed in campus dormitories and be required to eat at University dining halls unless given permission to commute or to live at sorority or fraternity houses. University board is optional for seniors and is available on a cash basis. Sororities and fraternities may furnish regular board to members up to the approved capacity for each house.

Students who are assigned to housing operated by the University are expected to occupy them for the entire school year and may not be released sooner except as their places are taken by suitable substitutes.

Dormitories will be open for occupancy on the day immediately preceding the opening of the University.

Students assigned to dormitory rooms will be responsible for the room rent of the entire semester. Room rent is not refundable.

Most dormitory rooms are double and are furnished with beds, mattresses, pillows, desks, chairs, and a chest of drawers. Students care for their own rooms and are responsible for any damage.

All student property must be removed from the rooms and the key turned in immediately after final examinations in June. Such

property not removed by the owner will be removed by the University and stored at the owner's expense.

Rooms for Women Students

Dormitory rooms are available for women students at Abigail Adams, Arnold, Crabtree, Hamlin, Knowlton, Leach, and Thatcher Houses.

Under the supervision of the Dean of Women, life in each dormitory is directed by a council of student leaders, advised by a full time housemother, so that conditions in the residence halls are conducive to study and good living habits. Through the women's branch of the Student Government, the responsibility is put upon each student to live according to her own best standards as well as according to the standards of the group.

Freshman girls will be assigned rooms in the dormitory and will be notified of the assignment prior to the beginning of college.

Near the close of each year, upperclass women will draw numbers to determine the order in which rooms may be chosen for the coming year.

Only students living in their own homes may commute. Upperclass women may apply to the Dean of Women for permission to live in a sorority house, or to earn room and board in a private home.

Dormitories are maintained for undergraduates; graduate women from other countries are also accommodated whenever possible. The Dean of Women's Office maintains a list of rooms in Amherst available for graduate women students.

Rooms for Men Students

Dormitory rooms are available for male students at Baker, Butterfield, Lewis, Van Meter, Brooks, Mills, Chadbourne, Greenough, Berkshire, Middlesex and Plymouth Houses.

Upperclassmen should make dormitory room reservations at the Housing Office before May 1. Assignment of dormitory rooms will be under the supervision of the Housing Office. Requests for permission to live off campus must be made in writing to the Dean of Men.

Rooms for Married Students

The University cannot guarantee facilities for married students; however, those married students who can be accommodated will be housed in the University apartment units. Assignments are under the direction of the Housing Office and all inquiries should be addressed to that office. Some students may be able to locate rooms or apartments off campus.

The University of Massachusetts reserves the right to change room assignments whenever necessary.

Advisory System

In order that from the day he enrolls the freshman may have some one to whom he may go for consultation and assistance, each student is assigned to a faculty adviser at the time of registration. It is the function of this adviser to help the student in adjusting himself to the work and life of the University. Academic progress reports issued by the Provost's Office are sent to the advisers periodically, and the students are expected to report to their advisers from time to time to discuss their academic standing. The adviser also forwards reports of academic standing to the parents. Both students and parents are encouraged to consult with the adviser whenever there are problems regarding studies or personal adjustments to college life.

At the beginning of the second semester of the freshman year each student will discuss his vocational and specialization plans with his adviser. If he can decide definitely upon the department in which he wishes to specialize, and the adviser approves, the student takes his election card to the head of that department for approval. In cases where students are not ready to designate a department of specialization they continue as general majors during the sophomore year under the direction of an adviser assigned by the head of the School in which the student is enrolled. Such general majors must select their field of specialization by the end of the sophomore year.

Automobiles

Only students 21 years old or over, seniors, commuters and veterans are permitted to have automobiles or other types of automotive equipment on the campus or in the Town of Amherst. Vehicles must be registered with the Campus Police. Driving to and from classes is not permitted. Exceptions may be made in the case of an individual who has a severe physical limitation.

STUDENT ORGANIZATIONS

One of the values received from the University course is the training one acquires through participation in student activities. Student organizations offer excellent opportunities for development of leadership and broadening of outlook.

Student Government

The Student Senate operating under the student constitution and composed of elected representatives from the student body is the governing council of undergraduates. Its aim is to promote the general welfare of the University and, in doing so, groups of both students and faculty meet to further their mutual interests. The Student Senate directs student conduct and represents the interests of the student body before the faculty.

Academic Honor Societies

Phi Kappa Phi. The Massachusetts Chapter of the Honor Society of Phi Kappa Phi was installed on the campus in 1904. Its prime object is to emphasize scholarship and character. Senior students from all departments of the University are eligible for election to membership provided the scholastic and character requirements of the Society are met.

Sigma Xi. The Society of Sigma Xi is a scientific fraternity to which members are elected on the basis of outstanding scientific research. The local chapter was established in 1938.

Omicron Nu. The Alpha Pi chapter of the Society of Omicron Nu was installed on the campus in 1952. The purpose of the society is to recognize superior scholarship and to promote leadership and research in home economics. Membership is open to juniors and seniors majoring in home economics who meet the requirements of the society.

Phi Tau Sigma. Phi Tau Sigma Honorary Society is the international honor society for food science. It was founded at the University of Massachusetts in 1953, and its executive headquarters are permanently located here. Its purpose is to encourage and recognize achievement in food science. Senior students from all departments related to food science are eligible for election to

membership if they meet scholastic and character requirements of the University Chapter.

Sigma Gamma Epsilon. The Beta Theta chapter of the Sigma Gamma Epsilon Fraternity was installed at the University of Massachusetts in 1951. The purpose of the fraternity is to stimulate scholastic, scientific, and social advancement of its members and the extension of the relations of friendship and assistance between the universities and scientific schools with recognized standings in the United States and Canada, which are devoted to the advancement of the earth sciences. Membership is open to men majoring in geology, mining, metallurgy, ceramics, petroleum engineering, or other branches of earth sciences, who meet the requirements of the fraternity.

Phi Eta Sigma. The Society of Phi Eta Sigma was installed on the campus in 1955 to recognize outstanding scholastic achievement by freshmen men.

Tau Beta Pi. The Massachusetts Zeta chapter of Tau Beta Pi was installed on the campus in the fall of 1955. The society exists for the purpose of honoring engineering students of high scholarship and character, and who also participate in campus activities. Senior and junior students in the School of Engineering are eligible for election to membership if they meet the requirements.

Sigma Delta Psi. The Society of Sigma Delta Psi was installed on campus in 1955 to promote physical, mental and moral development of college men.

Service Fraternity

Alpha Phi Omega. A fraternity which renders various kinds of service to the University. The group is composed of former members of the Boy Scouts of America.

Student Honor Societies

Adelphia. The men's senior honor society, recognizing students who have been leaders in the extra-curricular activities of the campus.

Mortar Board. The Isogon Chapter of Mortar Board was installed at the University of Massachusetts in 1955. The purpose of the Society is to promote college loyalty, to advance the spirit of service and fellowship among University women, to maintain a high standard of scholarship, to recognize and encourage leadership, and to stimulate and develop a fine type of college women. Membership is composed of a total of not less than five or more than twenty-five

girls from the senior class selected on the basis of service, scholarship, and leadership.

Maroon Key. Men's sophomore honor society, comprised of 25 students elected at the end of the freshman year.

Scrolls. Women's sophomore honor society, comprised of 15 students elected at the end of the freshman year.

Fraternities and Sororities

Social fraternities on the campus include Alpha Epsilon Pi, Alpha Gamma Rho, Alpha Sigma Phi, Alpha Tau Gamma, Delta Sigma Chi, Kappa Kappa, Kappa Sigma, Lambda Chi Alpha, Phi Mu Delta, Phi Sigma Kappa, Q.T.V., Sigma Alpha Epsilon, Sigma Phi Epsilon, Tau Epsilon Phi, Theta Chi. An Inter-Fraternity council, consisting of representatives of these fraternities, has charge of rushing and all general matters dealing with fraternity life.

Sororities include Chi Omega, Kappa Alpha Theta, Kappa Kappa Gamma, Phi Delta Nu, Pi Beta Phi, Sigma Delta Tau, and Sigma Kappa. The Pan-Hellenic Council, made up of representatives from the sororities, supervises rushing and other sorority matters.

Extra-Curricular Activities

All extra-curricular activities are supervised by the Committee on Recognized Student Organizations composed of alumni, faculty, and students. Recognition is given in the annual award of gold and silver medals.

The Collegian. This is a tri-weekly newspaper published by undergraduates.

The Quarterly. A magazine in which the literary and artistic efforts of the students are published.

Index. The year book.

University Handbook. Published annually as a campus book of reference.

Ya Hoo is the campus humor magazine published three times a year.

University Musical Organizations. Open to all students of the University. For instrumentalists: Band, dance band, orchestra and ensembles; for vocalists: Chorus, Chorale, Operetta Guild and small combinations. A women's drill team, the Precisionettes,

performs at home games and ceremonies. The University Concert Association provides an annual series of major concerts by famous artists.

Drama. Drama is represented on the campus by the Roister Doisters, open to all four-year students interested in theater arts; and the University Players, open to those students who have shown outstanding ability, effort, and interest in some phase of dramatics through the Roister Doisters.

In addition, there are approximately 100 student organizations which offer an opportunity to participate in small group meetings.

Inter-Collegiate Athletics

The University Intercollegiate Athletic Program is supervised by the University Athletic Council and is composed of the following members: five faculty members appointed by the President, three alumni representatives appointed by the Directors of the Alumni Association, the Executive Secretary of the Alumni Association, and ex officio, the Director of Athletics.

The University believes there are educational advantages in participating in a well-organized intercollegiate and intramural sports program. In intercollegiate athletics, the University is represented by teams in all the leading sports, including football, soccer, cross-country, basketball, swimming, wrestling, indoor and outdoor track, hockey, rifle and pistol, baseball, tennis, golf, lacrosse, gymnastics, skiing.

The University also supports a broad program of intramural activities, in which all students are encouraged to participate. The range of sports available each year includes the team sports of touch football, basketball, softball, volleyball. Individual activities include tennis, bowling, badminton and golf.

The University of Massachusetts is a member of the Yankee Conference, the National Collegiate Athletic Association, the Eastern College Athletic Conference, the Association of New England Colleges for Conference on Athletics, and the I.C.A.A.

Professional Clubs

There are numerous professional clubs, established in connection with the various major courses of study. These clubs stimulate the students' professional interest in their chosen subject matter fields and afford opportunity for discussion of technical subjects of mutual interest.

UNIVERSITY BUILDINGS

Today's campus at the University of Massachusetts, with well-established and seasoned buildings is marked by an energetic expansion of existing facilities and construction of modern laboratories, classrooms and dormitories to meet an enrollment of 10,000 by 1965.

Existing buildings housing chemistry and the library will be doubled in size by new additions. Old wooden buildings are gradually being replaced by sturdy brick and concrete.

For the past five years, the Massachusetts Legislature has shown increased interest in supporting the capital outlay requests of the Board of Trustees by appropriating millions of dollars for buildings to educate Massachusetts youth.

A Master Plan of expansion has been drawn by a Boston engineering firm and for the first time, a formal chart of growth has been recorded in a new publication, The Master Plan.

During its 1957 session, the Massachusetts Legislature appropriated nearly eight million dollars for the University budget. Since 1947, over $25,000,000 has been appropriated for buildings.

A unique plan of financing covers an important area of University building needs, the University of Massachusetts Building Association, originated by a group of alumni and private investors. Student fees support and operate income-producing buildings, including dormitories, faculty apartments and the Student Union. Under this plan, private investors supply the necessary investment for construction of the building while fees from students maintain the buildings and will eventually liquidate the long-term bonds.

Construction has begun on new junior faculty and married student housing and completion date is scheduled for the Fall of 1958.

The College Pond is the center of the campus, and long range plans call for its preservation as a scenic highlight of the central campus.

An alphabetical list of buildings follows:

Abigail Adams House. Women's Dormitory for 100 students. Erected in 1919 and named for Abigail Adams, wife of John Adams, second president of the United States.

Alumni Field. Funds and labor for its construction were contributed by alumni and students. Included are two baseball diamonds; three practice football fields; two soccer fields; a Lacrosse field and a cinder track. Twenty-four tennis courts are adjacent.

BUILDINGS

Arnold House. Women's dormitory for 205 students. Constructed in 1954 by the U. Mass. Building Association and named in honor of Sarah Louise Arnold, former trustee of the University.

Baker House. U. Mass. Building Association dormitory for 360 men. Erected in 1951 and named in honor of Hugh P. Baker, University president from 1933 to 1947.

Bowditch Lodge. Headquarters for 4-H Club activities. Built in 1936 with funds contributed by 4-H Club members, friends, and organizations. Named for Nathaniel Bowditch, trustee of the University from 1896-1945.

Brooks House. U. Mass. Building Association dormitory for 180 men. Named in honor of William Penn Brooks, professor of agriculture and Director of the Experiment Station, 1888-1921.

Butterfield House. U. Mass. Building Association dormitory for 147 students with a dining hall. Named for Kenyon L. Butterfield, President of the University from 1906-1924.

Chadbourne House. U. Mass. Building Association dormitory for 150 men. Built in 1946 and named for Paul Ansel Chadbourne, President of the University from 1866-67 to 1882-83.

Chenoweth Laboratory. Classrooms and laboratories including Commercial Practice Laboratory for the Department of Food Technology. Erected 1929 and named in honor of Walter W. Chenoweth, pioneer in the field of Food Technology and first Head of the Department.

Clark Hall. Offices, lecture rooms, laboratories, and greenhouses of the Department of Botany are located here. The herbarium contains about 122,000 sheets of seed plants and ferns, 5000 sheets of liverworts, mosses, algae, lichens, and a collection of 20,000 specimens of fungi. The building was erected in 1906 and named in honor of William S. Clark, President of the University and Professor of Botany from 1867 to 1879.

Conservation Building. Formerly the Old Botany Museum, erected 1867. Houses laboratories, classrooms and offices for the Department of Forestry and Wildlife Management.

County Circle. Five residence halls erected in 1948 by the Commonwealth. Hampshire and Suffolk Houses contain 30 two-room and three-room apartments for married persons and their families. Plymouth, Berkshire, and Middlesex Houses contain dormitory rooms for approximately 144 students each.

Crabtree House. U. Mass. Building Association dormitory housing 154 students, completed in 1953. Named for Lotta Crabtree, benefactress of the University.

Dining Commons. Central University dining commons for men and women students.

Dramatic Workshop. Headquarters for instruction in stagecraft.

Draper Hall. Classrooms and offices of the School of Business Administration; also department of agricultural economics and farm management. Erected in 1903 and renovated in 1954. Named in honor of James Draper, for 20 years a Trustee of the University.

Durfee Conservatories. New Durfee Conservatories were erected in 1954. They contain collections of plants of various types, including desert, tropical and sub-tropical, botanical and horticultural importance. These greenhouses replace the Durfee Planthouses erected in 1867 from money given by Dr. Nathan Durfee of Fall River, Treasurer of the Board of Trustees.

East Experiment Station. Houses operations of the Bureau of Government Research.

Engineering Annex. Laboratories, classrooms, and offices for the School of Engineering. Erected in 1948.

Engineering Building. First wing completed in 1950 provides laboratories for industrial electronics, communications, ultra high frequency, electrical measurements, illumination and metallurgy, as well as classrooms and offices for the School of Engineering. Building completed in 1955. Addition contains laboratories for civil engineering in soil mechanics, sanitary engineering, applied mechanics and structural engineering, industrial engineering laboratories for time and motion studies and work simplification. New metallurgical facilities include new processing laboratory, X-ray and non-destructive testing equipment. Mechanical engineering and the School of Engineering laboratories are also housed here. The University radio studio, together with its transmitter are housed on the first floor and the campus weather station will be located on the third floor. This building serves also as temporary headquarters for the School of Nursing and contains office space for several members of the history department.

Farley 4-H Club House. Headquarters for 4-H Club activities. Erected in 1933 by funds contributed by 4-H Club members and interested friends and organizations. Named to honor George L. Farley for 25 years State Leader of County Club Agents.

Farm. In the University barns are maintained Percheron and Morgan horses; Aberdeen-Angus, Ayrshire, Guernsey, Hereford, Jersey and Holstein cattle; Shropshire and Southdown sheep and Chester White swine. The University farm is operated as a livestock farm, producing all its necessary roughage in the form of pastures, hay and silage and a portion of its required grain.

BUILDINGS

Fernald Hall. Erected in 1909 and named in honor of Professor Charles H. Fernald who served the University from 1886 to 1909, built a strong Department of Zoology, created the Department of Entomology, and acted as Director of the Graduate School. Fernald Hall houses the Departments of Entomology and Geology and offices and classrooms of the Department of Zoology. Offices and laboratories of the Western Sanitary District, Massachusetts Department of Public Health, are also located here. The Entomology collection includes over 160,000 insects. There are also Geological and Zoological museums.

Fisher Laboratory. Erected in 1910 and named for Jabez Fisher, one of the foremost early horticulturists of the state. Laboratories for Pomology are located here, including a quick freezing room, six refrigerator rooms, two rooms for the storage of frozen products, two classrooms, and three packing rooms.

Flint Laboratory. Laboratories and classrooms for dairy and animal science. Erected in 1911 and named for Charles L. Flint, fourth president of the University.

French Hall. Built in 1908 and named for Henry F. French, first president of the University. This building houses the Departments of Floriculture, Pomology and Olericulture. In the rear of the building are the Edward A. White greenhouses, built in 1908, enlarged in 1939 and devoted to cultivation of carnations, roses and chrysanthemums. One house is maintained as a conservatory and contains a collection of decorative plants.

Goessmann Chemistry Laboratory. Nearly completed is the addition to the original building built in 1924 and named for Charles A. Goessmann, first professor of chemistry. The present facilities of eight large laboratories, auditorium, library and lecture rooms will be doubled.

Goodell Library. The main collection of the University Library is housed in the Goodell Library building, a brick building erected in 1935 and named in honor of Henry Hill Goodell, who served as President and Librarian from 1886 to 1905.

Construction of a 2 million dollar addition begun during the winter of 1958 will double the existing capacity.

The library contains the main book and periodical collection of the University library system which now totals over 200,000 volumes and is growing at the rate of over 8,000 volumes per year. The Library subscribes to over 1,000 periodicals and serials of learned societies. It is also a designated depository for federal government publications including particularly those of the United States Department of Agriculture.

The main collection includes the books and periodicals in the humanities and social sciences together with some of the book material in the natural, physical, and applied sciences.

In the Goodell Library building is the central card catalog. The main floor includes a large reading room, a reference room, circulation desk, reference and current periodical desk, both in the main lobby, and cataloging and administrative offices. On the second floor is another large reading room. There is a study for faculty and a University History Room in memory of Dean William L. Machmer in which the historical records of the University are kept and exhibited.

Besides the Goodell Library there are 32 departmental libraries totaling about 38,000 books and bound periodicals located in the several University buildings with the teaching departments and laboratories. These libraries vary from small working libraries to extensive collections in special fields. Particularly worthy of note are the botany, chemistry and entomology libraries.

Greenough House. U. Mass. Building Association dormitory for 148 men students, with dining hall. Erected in 1946 and named in honor of James Carruthers Greenough, president from 1883-1886.

Grinnell Arena and Abattoir. Built in 1910 for livestock judging. The abattoir was constructed in 1930. Named in honor of James S. Grinnell, for 22 years a University Trustee.

Gunness Engineering Laboratory. Laboratories for industrial combustion engines, material testing, fluid mechanics, heating, air conditioning and refrigeration, electrical machinery, electrical circuits. Built in 1948, it is named in honor of Christian I. Gunness, professor of agricultural engineering from 1914 to 1946. Gunness houses the classrooms and offices of the School of Engineering.

Hamlin House. U. Mass. Building Association dormitory for 175 women, built in 1949 and named for Margaret P. Hamlin, first placement officer for women, serving from 1919 to 1948.

Hasbrouck Physics Laboratory. Completed in 1949. Contains laboratories and lecture rooms designed for the various main divisions of physics. Named in honor of Philip B. Hasbrouck, Professor of Physics and Registrar of the University during the period 1905 to 1924.

Hatch Laboratory. Laboratory where small animals and chickens are used in connection with investigations into human, animal and poultry nutrition.

Curry S. Hicks Physical Education Building. Erected in 1931 from funds contributed by alumni and friends of the University, supplemented by an appropriation from the Legislature. Houses

a swimming pool, exercise hall, basketball courts and locker rooms. Houses the Division of Physical Education courses. It is named for Curry S. Hicks, professor and head of the division from 1911 to 1949.

Homestead. Women majoring in home economics receive home management practice in this colonial home, newly-equipped with homemaking conveniences.

Infirmary. Three buildings, assigned for bed patients, outpatients and an isolation building.

Knowlton House. U. Mass. Building Association for 175 women students. Erected in 1950 and named in honor of Helen Knowlton, associate professor of Home Economics, 1924-1941.

Leach House. U. Mass. Building Association dormitory for 154 women. Built in 1953 and named in honor of Mrs. Joseph A. Leach, chairman of the Women's Advisory Council and a former trustee. French House is located here and majors in French together with a French-speaking resident develop conversational fluency.

Lewis House. U. Mass. Building Association dormitory for 150 men. Built in 1940 and named in honor of Edward M. Lewis, Dean from 1914 to 1925 and President, 1925-1927.

Liberal Arts Annex. A temporary structure housing offices for psychology, military science and women's physical education. Construction is scheduled to begin in 1958 of a new Liberal Arts Classroom. Nearly completed is an extensive building that will house all activities of the women's physical education program.

Machmer Hall. A $1,000,000 classroom building, providing offices and instruction facilities for the departments of economics, education, German, government, mathematics, philosophy, Romance languages and sociology. Named for William Lawson Machmer, Dean of the University from 1926 to 1953.

Marshall Hall. Erected in 1915 and named for Dr. Charles Marshall, a former Professor of Bacteriology and Director of the Graduate School. Building provides laboratories and classroom space for the department of bacteriology and the department of zoology.

Mathematics Building. Temporarily housing offices of speech department and research facilities for geology.

Memorial Hall. Erected in 1921 by alumni and friends in memory of those men who died in World War I. Included is a Memorial Room in which the names of those members of the University family who died in the service of their country are appropriately

enshrined. This building houses the alumni headquarters, also the department of music.

Mills House. U. Mass. Building Association dormitory for 150 men students. Erected in 1948 and named in honor of George F. Mills, teacher of English from 1890 to 1914 and Head of the Division of Humanities.

Munson Hall. Headquarters for the Division of Youth Work (4-H) and Department of Agricultural Communications. Named in honor of Willard A. Munson, a graduate of the University in 1905 and Director of the Extension Service from 1926 to 1951.

Old Chapel. Erected in 1885. Auditorium, seminar room, classrooms and offices for English and history.

Paige Laboratory. Erected in 1950 and named in honor of James B. Paige, a graduate in the class of 1882 and Professor of Veterinary Science from 1891-1922. The building contains classrooms and laboratories. Laboratories for State Control and research work in animal diseases are also located here.

Poultry Plant. Consisting of a number of modern buildings, in which instruction and research in ventilation, breeding, feeding, incubation, brooding, marketing and management of poultry and poultry enterprises take place. Rhode Island Reds, Barred Plymouth Rocks, White Plymouth Rocks, New Hampshires and S. C. White Leghorns and several other breeds are maintained here on a commercial basis.

Power Plant. General maintenance of the University.

Shade Tree Laboratories. Constructed in 1948 for research on shade tree problems, including Dutch Elm Disease.

Skinner Hall. Laboratories, classrooms and offices for the School of Home Economics. Erected in 1947 and named in honor of Edna L. Skinner, first Dean of the School of Home Economics.

South College. Administration building, including offices of President, Treasurer, Provost, Secretary, Registrar, Dean of Arts and Sciences, Dean of Graduate School, Director of Placement Service, Dean of Women, Dean of Men, and Director of Publications. Erected 1885.

Stockbridge Hall. Administrative offices of the College of Agriculture and the departments of agronomy, animal husbandry and poultry husbandry are located here. Erected in 1914 and named for Levi Stockbridge, first professor of agriculture and former president of the University. Bowker Auditorium, the main auditorium on the campus, is also located here. It is named for William

H. Bowker, a member of the first graduating class, Trustee of the University, and one of the pioneers in the fertilizer industry.

Stockbridge House. One of the oldest houses on campus, this early-American homestead serves as the center for Faculty Club activities.

Student Union. The largest of the U. Mass. Building Association projects, this million dollar structure of contemporary design is supported entirely by private investment with student fees providing operating income. The Union houses a ballroom-auditorium; offices for student activities; University store; coffee shop; barber shop; bowling alleys and billiard room; chaplains' office; lounges and small dining rooms.

Thatcher House. Women's dormitory for 150 students. Erected in 1935 and named in honor of Roscoe W. Thatcher, President from 1927-1932.

Van Meter House. U. Mass. Building Association dormitory for 300 men students. An addition was completed in 1957. It was named for Ralph A. Van Meter, 13th president who retired in 1954.

West Experiment Station. The State Control Service is centralized here. Feeds, fertilizers, and seeds are analyzed or inspected in accordance with state law. Erected in 1886.

Wilder Hall. Contains classrooms, drafting rooms and offices of the department of landscape architecture. Erected in 1905 and named for Marshall P. Wilder, a pioneer in the movement of agricultural education in Massachusetts, and one of the University's first Trustees.

Wildlife Laboratory. Laboratories for graduate students in wildlife management.

SPECIAL SERVICES

Religious Life

The University makes an effort to provide a wholesome and stimulating spiritual atmosphere for the students by cooperating with official agencies of the three faiths most largely represented at the University.

On the campus the religious life of Catholic students is enriched by the Newman Club, of which Rev. David J. Power of Saint Brigid's Parish is chaplain. Jewish students may participate in services and activities at the local Hillel House, under the chaplaincy of Rabbi Louis Ruchames of Northampton; and Protestant students may join in worship and other religious activities conducted by the Student Christian Association, under the guidance of the Rev. Albert Seely, chaplain to Protestant students.

The churches of Amherst provide not only the usual opportunities for worship and participation in church work, but special events for students. Students are particularly encouraged to attend Sunday service in the local church of their respective faiths.

Health Service

The Health Service is a separate administrative unit dealing with all matters directly or indirectly influencing or affecting the health of staff members, employees, students, or campus visitors.

The University endeavors to safeguard the health of all students while on the campus. Basic medical attention is provided, including preliminary diagnosis, primary treatment of injuries, and temporary care of the sick. A group of three infirmary buildings and a staff of resident physicians and resident nurses is available to perform these functions.

(1) The Student Health physicians have offices in the out-patient Infirmary Building, where they may be consulted during college hours.

(2) The Infirmary consists of three buildings, one for bed patients, one for contagious cases, and one for out-patient cases, where the out-patient clinic is conducted daily by the Student Health physicians.

(3) The students are urged to consult the resident physicians at the first sign of physical disorder, or even for minor

accidents. Many severe illnesses and much lost time may be avoided by early or preventive treatment.

(4) House calls cannot be made to dormitories, sororities, or fraternities except in the case of emergency. The University cannot assure each student that a resident physician will always be available. In such instances students are encouraged to consult a town physician, although any expense connected with such service shall be borne entirely by the student. One resident physician is on call at all times to care for emergencies beyond the scope of the nurse on duty.

(5) No charge is made to Infirmary bed patients up to seven days in each school year; time in excess of seven days will be charged at the rate of $4 per day. A nominal charge may be made to out-patients for miscellaneous treatments.

(6) In addition to the fee charged as specified in paragraph 5, the following additional expenses will be charged to the patient:

Nurses. If a special nurse is required for the proper care of an individual, the services and board of this nurse will be paid by the patient. Such a nurse will be under the general supervision of the resident nurse.

Professional Service. If a student requires continuous medical attention by a physician, he may be required to select a town physician and become responsible for fees charged by that physician.

Supplies. Special medical supplies prescribed by a physician will be charged to the patient.

Laundry. Expenses for personal laundry incurred by students while in the infirmary will be charged to the individual student.

(7) The Health Service recommends strongly that students participate in the blanket insurance program described in literature accompanying the initial bill rendered students each year. This program is a reimbursement insurance plan providing medical, surgical, and hospital care for both accident and illnesses at a very low cost. During the past years this plan has saved numerous patients from serious unexpected expense and the insurance payments have enabled the student to stay in school. The University has no financial interest in this and acts only as a clearing house to receive premiums, in order to give the low group rate.

(8) Students who require glasses are urged to make their prescriptions part of personal health records so that when glasses are lost or damaged, proper lenses can be made in the shortest possible time by local professionals.

The Placement Service

The University maintains a centralized Placement Service, the function of which is to assist students to secure part-time, summer, or permanent employment and to administer the required Placement Training Program.

The University is keenly interested that each graduate has an opportunity to serve his fellow men in an occupation consistent with his interests, abilities, aptitudes, and education. To assist students to accomplish their objectives, the following aids are available: cumulative student personnel records, occupational information, library, counselling and guidance in job hunting techniques, preparation of credentials and personal data sheets and personal interviews.

The Placement Service is the clearing center for all part-time jobs at the University. Students are assisted in obtaining part-time work during the college year and full-time work during the summer vacation. Employment is not guaranteed, but every effort is made to help those students who must work to meet their college expenses. In order to give assistance to as many needy students as possible, the Student Aid Committee has adopted the policy of limiting the maximum financial aid per student to the equivalent of board. The average earnings of students engaged in part-time work is approximately $150 per year.

All student loans, veterans' affairs and draft information are also functions of the Placement Service.

Publications and News Office

The University recognizes its obligation to provide the public with accurate information about its educational program. With the rising public interest in higher education, news of the University is sought by all communications media, including the daily and weekly press, radio and television.

In addition to providing information through mass media, the Publications and News Office maintains contacts with institutions of higher learning throughout the country with exchange of information in professional journals and publications of educational societies.

Daily training in news writing is provided for a limited number of students who report on University activities and prepare copy for general news releases.

The catalogues describing various phases of the academic program of the University are edited in the Publications and News Office.

Alumni Association

The Associate Alumni is the general organization of the alumni, men and women, of the University of Massachusetts. The association maintains headquarters at Memorial Hall, erected by alumni and friends in honor of those men of the University who died in World War I.

It publishes a magazine, *The Massachusetts Alumnus,* as the alumni publication of the University.

According to its by-laws the corporation is constituted for the purpose of promoting the general usefulness of the University of Massachusetts; of cultivating among its graduates and former students a sentiment of mutual regard; and of strengthening their attachment to their Alma Mater.

Under sponsorship of the U. Mass. Building Association, comprised of alumni who volunteer their services, 14 dormitories, a faculty apartment building and a Student Union Building have been constructed on the campus.

The governing body of the Associate Alumni consists of its officers and a board of directors. Four directors are elected each year and serve a term of four years. All graduating seniors become members of, and contributors to, the association at graduation, according to a tradition set by the Class of 1940.

Audio-Visual Center

The Audio-Visual Center is organized to help the professional staff through the use of audio-visual materials. The center has libraries of aids, a pool of equipment and provides certain services. About 850 titles are available in a sound motion picture library and a filmstrip library of 400 titles. Technical assistance is available for the preparation of aids for instructional purposes, including recordings, charts and other graphics.

SPECIAL INSTITUTES AND SERVICES

Bureau of Government Research

A Bureau of Government Research was established at the University of Massachusetts on October 1, 1955. The Bureau is staffed

by professional personnel experienced in local government research. Its work consists of research, publication and cooperative activities with local government officials of the Commonwealth.

College English Association

The offices of the Executive Director of the College English Association are maintained in South College. This is a national association of teachers of college English. The organization's monthly publication, *The CEA Critic,* is edited and published on the campus.

American Humanities Center

The offices of the executive director of the American Humanities Center for Liberal Education are maintained at South College. This is a national agency fostering strengthened relationships between the liberal arts and sciences and the world of affairs and action.

The American Humanities Seminar, under the auspices of the University and the Center, is held annually on campus (late June or early July). It seeks to strengthen cooperation among the liberal arts and sciences and the technological fields.

New England Field Training Station

Sponsored jointly by the Public Health Service of the U. S. Department of Health, Education and Welfare, and the University's Department of Bacteriology and Public Health, the New England Field Training Station has been located on the campus since 1949. The Station instructs health department sanitarians and other health department personnel through in-service training courses.

Four College Cooperation

The University shares with nearby colleges, Smith, Mount Holyoke and Amherst, an exchange course program for advanced students. With the permission of Provost, the student may enroll in an advanced course not available at the University. Mutually acceptable arrangements among the four colleges have been made concerning costs and transportation.

UNDERGRADUATE CURRICULA

Undergraduate instruction is organized into the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing, and the Division of Physical Education for Men.

This section of the catalogue deals with the opportunities for study and the curricula available in each of these departments of the University.

COLLEGE OF ARTS AND SCIENCES

FRED V. CAHILL, JR., *Dean*

The College of Arts and Sciences includes those departments offering instruction in the humanities, the physical and biological sciences, and the social sciences. Its curricula comprise both general education courses essential for enlightened citizenship and those necessary for specialized and professional training.

The work of the first two years is largely prescribed, specialization occurring in the junior and senior years. The concentration of the junior and senior years gives the student as high a proficiency in his field of specialization as is possible without sacrificing the objectives and requirements of a well-rounded education.

The majority of the curriculum prescribed for all freshmen and sophomores, regardless of their fields of specialization, is taught in the College. In addition, each of the departments of the College offers courses leading to undergraduate specialization in its particular field. There are also curricula designed to meet the special needs of pre-medical, pre-dental, and pre-veterinary students; of those planning to enter the public health service; and of those interested in social work.

In sum, the College provides training for: Persons primarily seeking a liberal education; those who, wishing to go on to specialization in one of the fields of the College, seek a liberal education and the beginnings of specialization; those, in other parts of the University, whose basic professional interests are outside the range of the College.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
*Speech 3	2	*Speech 3	2
Math. 7 or 1	3	Math. 8 or 10	3
[1]Zoology 1, Botany 1, or Geology 1	3	[1]Botany 1, Zoology 1, or Geology 1	3
Foreign Language	3	Foreign Language	3
[2]Elective		[2]Elective	3
Military 1 (men)	1	Military 2 (men)	1
Physical Education 3 (men)	1	Physical Education 4 (men)	1
Physical Education 7 (women)	2	Physical Education 8 (women)	2

[1] Those intending to major in the humanities or social sciences may take Chemistry 1 and 2 in place of Botany 1, Zoology 1, or Geology 1. Students intending to major in Bacteriology, Botany, Chemistry, Entomology, or to follow the pre-medical or pre-dental curriculum take Botany 1 and Zoology 1.

[2] Those planning to major in biological and physical science departments or to follow the pre-medical or pre-dental curriculum take Chemistry 1 and 2 (or 4); others take History 5 and 6.

* May be taken either semester.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Sociology 25, Psychology 26, or Economics 25	3	Economics 25, Sociology 25, or Psychology 26	3
[1]Science	3-4	[1]Science	3-4
[1]2 electives	6-7	[1]2 electives	6-7
Military 25 (men)	1	Military 26 (men)	1
Physical Education 27 (women)	2	Physical Education 28 (women)	2
Physical Education 33 (men)	1	Physical Education 34 (men)	1

[1] In selecting the required science course and the two electives, students should be guided by the recommendations for sophomore work given under the descriptions of junior-senior curricula that follow. The sciences available are:

Bacteriology 31
Botany 1, 25, 26, 28, 30
Chemistry 1, 2, 4, 29, 30, 33
Entomology 26
Geology 1, 28
Mathematics 29, 30
Physics 25, 26
Zoology 1, 25, 35

JUNIOR-SENIOR CURRICULA

Major work is available in the following departments during the last two years.

Bacteriology

R. L. FRANCE, *Adviser*

The courses in bacteriology have been planned to furnish (1) a general and applied training for students majoring in other departments who must have some knowledge of bacteria and (2) specialization for those contemplating a professional career in bacteriology.

Students majoring in bacteriology should complete the following courses in their sophomore year: Chemistry 29 and 30, Zoology 35, and Bacteriology 31. Physics 25 and 26 are advised and may be elected junior year by bacteriology majors.

During the junior and senior years the following courses should be taken: Chemistry 51, 52, and 79; Zoology 69 and 84; Public Health 61, 62, and 88; Bacteriology 51, 52, 56, 81, 82, 85, or 95.

Botany

T. T. Kozlowski, *Adviser*

Courses in botany aim to: (1) prepare students for teaching or research careers in biological sciences in high schools, universities, experiment stations, and industry; (2) acquaint students majoring in other fields to scientific method as part of their general education program; and (3) supplement work of other fields in which knowledge of plant life is important.

Specialization in botany assumes the satisfactory completion of certain basic and supporting courses prior to the junior year. These include Botany 1, 25, and 26; Chemistry 1, 2, and 29; and a modern language. Two years of German are advised. The junior-senior program requires that courses in botany to the amount of 15-30 credits be chosen under the guidance of the adviser.

Botany majors who plan to teach biological sciences in high school should take Zoology 1, 25, and 35, preferably before the senior year and the concentrated education block (Education 52, 85, 88) during either semester of the senior year. The program of required botany courses will be adjusted by the adviser.

Chemistry

W. S. Ritchie, *Adviser*

The objectives in chemistry are to give the student an understanding of the subject which will enable him to appreciate the relation of chemistry to other sciences, and to industry, and to provide training for those who intend to become teachers and workers in the allied sciences, and for those who wish to go on to graduate study and into a professional career in chemistry. Completion of the course in chemistry fits the student for positions in the chemical industries and related fields as well as in the agricultural industry, for employment in state and federal agricultural experiment stations and commercial laboratories, for teaching and for graduate study.

Students planning to major in chemistry should elect German in the freshman year. The sophomore program should include Chemistry 29, 30; Mathematics 29, 30; and Physics 25, 26, German 25, 28.

In the junior year the chemistry major takes Chemistry 51, 52, 65, and 66. In the senior year he takes Chemistry 83, and elects at least three of the following courses: Chemistry 77, 81, 82, 86, 93, 94.

Economics

P. L. Gamble, *Adviser*

In economics the aims are twofold: (1) to give the student an understanding of economic theory and of the application of economic principles to the organization of society; (2) to provide students with the elementary training necessary for further study and solution of economic and business problems.

The department requires that all majors irrespective of the career desired take the following courses: Economics 53, 73, 79, Accounting 25, and Statistics 79 or Mathematics 62. In addition, each student must select an additional 12 credit hours of work from the Economics curriculum. No major student is permitted to take more than 36 junior-senior credit hours of economics, agricultural economics and business administration courses. In choosing elective courses students are urged to select courses in the humanities and preferably some from the allied fields of history, philosophy, government, psychology, and sociology. Those intending to major in economics should elect Economics 26 in the sophomore year.

For the majors in economics, there are offered courses which may be combined to serve as preparation toward a number of different careers in business, government, and teaching. Possible fields include: Banking and finance, international trade, labor and personnel relations, market research, public utilities, including transportation, social security, statistics.

English

M. H. Goldberg, *Adviser*

The department of English offers courses in English composition, language, and literature. Students majoring in English must conform to the requirements for freshman and sophomore years, and in choosing sophomore electives should include one semester of English history, and two semesters of foreign language. At least two of the total of four semesters of foreign language required of English majors must be above the elementary level.

The courses in English are intended to enable students to express themselves effectively and to appreciate humanistic values and the ideals of English-speaking people throughout their history. The courses also offer an appropriate, and in some instances an adequate, classroom training for work in such fields as teaching, authorship and editing.

The student majoring in English must earn 30 credits in elective courses in English. However, for six of these he may substitute elective courses in journalism, speech, advanced foreign languages beyond departmental requirements, or foreign literature in translation.

Entomology

C. P. ALEXANDER, *Adviser*

Courses in entomology serve a variety of functions, such as to give students a broad knowledge of insects, particularly in their relations to man, his crops, his animals, and his health. Students are trained to become entomologists in the service of the United States, or in various state, territorial, or foreign services, especially in the field of agriculture. Other fields of training include forest entomology; medical entomology; control of pests in buildings; research, technical service or sales work with manufacturers of insecticides; teachers of zoology, particularly entomology, at the university level; and various other branches.

The courses in beekeeping are offered with the following aims: (1) to meet the increase in vocational opportunities for the production of bees or honey as a business; (2) to study the beekeeping needs of fruit and truck-crop industries and the part that bees play in the pollination of flowers; (3) to acquaint the student with a recreational field that can be made profitable.

Majors are required to take Entomology 26 in the sophomore year. Strongly recommended sophomore subjects include Botany 25, 26; Zoology 25, 35; Chemistry 29, 30; and foreign language.

Juniors and seniors should support their work in entomology with the following courses: Botany 51, 52; Bacteriology 61, 62; Chemistry 51, 52; Zoology 51, 69, 70; Pomology 56; English 84, and selected courses in education, floriculture, forestry, horticulture, and other subjects.

Geology and Mineralogy

H. T. U. SMITH, *Adviser*

The courses in geology are offered with three objectives in view: (1) to contribute to the cultural education of all students by providing a better understanding and a greater appreciation of the world we live in, and the evolution of life on it; (2) to give the basic preparation for a career in any of the various branches of geology; and (3) to afford the essential background in earth science required by students specializing in other fields such as engineering, conservation, agronomy, forestry, etc.

For students considering geology as a career, the opportunities are many. Those interested primarily in basic science may look to

positions in teaching, in museum work, on state and federal surveys, and in various research organizations. Those concerned mainly with applied science may direct their efforts toward work in mining geology, petroleum geology, engineering geology, and ground-water geology.

For a major in geology, minimum requirements are: 30 credit hours in geology, one year of physics, one year of chemistry, one semester of zoology, and mathematics through trigonometry and analytic geometry. Students contemplating geologic work as a career are urged to add the following: six additional hours of geology and an approved summer field course, one year of calculus, and at least one additional year of work in physics, chemistry, and/or biological science. Electives may be chosen also from courses in civil engineering, agronomy, and related sciences. Further recommendations as to the student's program are made by departmental advisers on an individual basis.

German

F. C. Ellert, *Adviser*

The courses in German are intended to give a practical knowledge of the language for the purpose of wider reading, research, and oral communication.

During the junior and senior years each student will complete not less than 24 and not more than 30 credits in the junior-senior German courses. German 59, 79, and 80 are required of all major students. Students planning to use the language professionally are also urged to supplement their courses here with a summer session at an approved school of German.

Government

John Harris, George Goodwin, Jr., *Advisers*

The courses offered by the department of government are designed to aid the student in gaining a knowledge of the nature, functions, and problems of government, and of the place of government in the modern world. Political theory, constitutional law, international relations, comparative government, politics and public administration are the principal areas covered.

Students taking work in government may prepare themselves for (1) graduate study in political science and government, (2) careers in public administration at federal, state, and local levels, (3) research concerning governmental problems, (4) the study of law, (5) entrance into foreign service, (6) teaching government and social science courses in secondary schools.

Majors in the field should elect Government 25 and 26 in their sophomore year. In the junior and senior years a minimum of

eight additional courses in government is recommended. In addition, supporting courses in the fields of history, economics, sociology, psychology or philosophy are suggested,

History

T. C. Caldwell, *Adviser*

Courses in history are designed to provide an understanding of man through a study of patterns of development in the past. The study should also give the student an introduction to major problems in world affairs.

A major in history has value to the general student as a humanistic discipline. It has application as preparation for careers in fields of teaching, law, government, journalism, ministry, library and business.

Prospective majors should elect either History 25 and 26 or History 31 and 32 in the sophomore year. Government 25 is recommended. Major students must earn a minimum of 26 credit hours in history from the junior and senior courses. The following courses are required: History 25, 26, 91, 92. The student must elect one of the following courses which deals with a period prior to 1500: History 51, 62, 73.

Journalism

A. B. Musgrave, *Adviser*

The journalism program is concerned with (1) the study of communication problems relevant to the media of mass communication, and (2) the best utilization of the University's liberal education resources by students who plan careers in newspaper work, communications research, public relations, magazine and radio journalism, or some other field of communications.

For such students the journalism courses are intended to provide both increased communication skill and relevant background. The courses may have special value also for students who plan to go into government service, law, education, and similar fields in which knowledge of the process and effects of communication is particularly useful.

The courses emphasize (1) the professional responsibilities of the mass media in a free society, (2) communications research, and (3) study of the reporting of those issues in public affairs which may be evaluated as contemporary history.

English-Journalism majors take five literature courses, English 84, and four journalism courses. Such students should select, in consultation with their adviser, an integrated program of elective courses to obtain the broadest and most liberal training.

Mathematics

A. E. Andersen, *Adviser*

The department offers courses designed to furnish a cultural background as well as a foundation for both undergraduate and graduate work in such fields of science as physics and chemistry, in engineering and in other technical subjects.

The courses recommended for majors in the department are designed to prepare students for high school teaching, graduate study in mathematics, actuarial work, statistical work, or work as engineering aides.

All majors are required to take Mathematics 29 and 30 and Physics 25 and 26 in the sophomore year. In the junior and senior years each major must take Mathematics 53, 54, 91, and 92 and must, in addition, complete at least 12 credits in other junior-senior courses. Prospective majors should consult the department, for a list of recommended courses.

Music

D. J. Alviani, *Adviser*

The courses in music are open to all students depending on their training, experience, ability and talent. The department of music supervises and directs the activities of a number of musical organizations which offer opportunities to students for the development of skill in playing, singing, acting, and attitudes for artistic growth. Music courses furnish an understanding of the history and interpretation of music, a knowledge of basic theory, and training in applied music.

The music major student is expected to adjust his elective courses to fit his individual needs in preparation for work in the fields of: Music education, music merchandising, private teaching, the ministry, the armed forces, church music, private school music, kindergarten music, bi-subject teaching, music library administration, music in radio, television, recreation and industry, institutional music therapy, and advanced study in music.

During the sophomore year all music majors must elect Music 25 and 26. They are required to take six semesters of Applied Music before graduation, three of which must be in piano. Each major student will be required to pass an examination in piano not later than junior year. Attendance at campus musical events and participation in music organizations each semester exclusive of freshman year will be required.

Philosophy

C. Shute, *Adviser*

Philosophy seeks a comprehensive understanding of the various areas of man's experience in their interrelatedness. In the context of the historically important theories, the courses concentrate on

methods of inquiry into the persisting questions of philosophy, standards of thought, clarification of ethical and aesthetic values, and the basis of criticism.

The student majoring in this subject will complete a minimum of 21 credits in junior-senior courses in philosophy. A wide range of supplementary courses is advised, among which the following are suggested: Art 75, 78; Chemistry 88; Education 51; English 72, 74, 79, 80; French 51, 52; German 56, 57; Government 66, 71, 72; Mathematics 72; Music 51, 52; Psychology 61, 90; Sociology 53, 82.

Physics

J. D. TRIMMER, *Adviser*

The courses give opportunity for the study of basic physical laws. From these courses students may make a selection to satisfy a major in physics, or to comply with requirements for graduate study.

Majors must take Physics 25, 26 and Mathematics 29, 30 in the sophomore year. Juniors and seniors are advised to take differential equations and vector analysis, and Physics 51, 52, 55 and 56.

Pre-Medical and Pre-Dental Curriculum

Advisory Committee for freshmen: E. L. Davis (Botany); G. Oberlander and J. Tyler (Chemistry); J. L. Roberts (Zoology); R. Wagner (Mathematics).

Advisory Committee for upperclassman: L. M. Bartlett (Zoology); J. H. Smith (Chemistry); E. J. McWhorter (Chemistry); W. S. Ritchie (Chemistry); H. Rauch (Zoology); D. P. Snyder (Zoology); W. H. Ross (Physics).

Pre-medical and pre-dental students are assigned to faculty advisers for their freshman year. At the end of their second semester, they will be assigned to a member of the Upperclass Committee who will be their adviser for the remainder of the course of study.

Pre-veterinary students may register in the College of Agriculture or College of Arts and Sciences. In the latter case, they will be assigned to advisers in the same manner as the other pre-professional students.

Medical schools do not look with favor on over-specialization in any field. They stress the importance of a broad general education. Since the University requires that every student who graduates must have selected at least 15 credits of junior-senior courses in some one department, the pre-professional student should include courses beyond the introductory level in all fields, especially in the humanities and social sciences. The student decides on his electives only with the advice and consent of his adviser.

Psychology

C. C. NEET, *Adviser*

The courses in the psychology department are designed (1) to impart an understanding of behavior and the application of this knowledge to problems of human adjustment; and (2) to give preparation for professional work in psychology and related fields.

Careers open to psychology majors include: Teaching and research, guidance and counseling, psychometrics, child welfare, clinical psychology, school psychology, social work, opinion polling, personnel and industrial work and engineering psychology. Graduate training is required for certain of these careers.

Students planning to major in psychology should elect Psychology 26 and 28 in the sophomore year. In the junior and senior years majors are required to take a minimum of 24 credits in psychology. Courses 51 and 90 are required. As broad a cultural background as major programs will permit is advised.

Majors planning careers primarily in clinical psychology, school psychology and in child welfare should elect specified courses in education, sociology, and zoology. Those planning careers in psychometrics, guidance and counseling, personnel and industrial work and engineering psychology should take certain courses in business administration, economics, education, industrial engineering and sociology; while those planning careers primarily in experimental psychology should plan to take certain courses during their four years in mathematics, physics, and zoology.

Public Health

R. L. FRANCE, *Adviser*

The Department of Bacteriology, through the cooperation of several departments of the University and the Massachusetts Department of Public Health, offers curricula for (1) a limited number of students interested in the many phases of public health service for which graduate work in medical or engineering schools is not essential; and (2) students planning graduate work in sanitary engineering.

Particular attention will be given to the training of sanitarians, district sanitary officers, food and milk inspectors, water and sewage treatment plant operators, technicians for public health laboratories, and agents for local boards of health. Students planning graduate work in sanitary engineering must also take Mathematics 29 and 30 (calculus) before the end of their junior year.

Students electing this major should complete the following courses during their sophomore year: Chemistry 29, Physics 25 and 26, Zoology 35 and Bacteriology 31.

During junior and senior years the following courses should be completed: Chemistry 51 and 52; Bacteriology 81 and 90; Public

Health 61, 62, 63, 84, and 88. Supporting courses in other departments will be selected with the guidance of an adviser.

Romance Languages

S. C. Goding, *French Adviser*
J. M. Ferrigno, S. F. Wexler, *Spanish Advisers*

Two majors are offered: French and Spanish. The courses in these curricula are intended to give rounded and practical knowledge of the languages for the purpose of wider reading, research, and oral communication, leading to a better understanding of all aspects of the intellectual, spiritual, and material attainments of the nations concerned.

Students majoring in French or Spanish are required to complete at least 30 approved junior-senior credits, six of which may be in English or another foreign language.

Sociology

J. H. Korson, *Adviser*

The courses in sociology are planned with two aims in view:

(1) To give the student an understanding of the factors which influence men in their activities and interests as members of society, and

(2) To prepare those students who are interested in teaching at the elementary or high school level; or those students interested in careers with government agencies; or in careers as social workers with state or private agencies to gain the pre-professional courses necessary before embarking on such careers. Some agencies require work on the graduate level before full-time employment is obtained, while others offer in-training opportunities to graduate majors in sociology. Programs for students interested in teaching are prepared in cooperation with the Education department.

All major students are required to take Economics 25 and Psychology 26. At least 24 junior-senior credits in sociology are required. Students are required to take Sociology 53 and 82 and are urged also to select courses in economics, history, government, psychology, and as many in the humanities as possible.

Social Work

J. H. Korson, *Adviser*

The American Association of Schools of Social Work indicates that the pre-professional subjects most closely related to professional work in this field are economics, political science, psychology, and sociology. The Association recommends that prospective students of social work or social administration take not fewer than

12 semester hours in one of these subjects while taking less in others. It also recognizes the value of courses in biology, history, English, as well as other subjects contributing to a broad cultural background for the student.

Speech

A. E. Niedeck, *Adviser*

The program in speech is planned to serve the students in the entire University who wish training in oral communication, and to provide an opportunity for students in the College of Arts and Sciences to major in speech. Areas of specialization within the major include Rhetoric and Public Address, Oral Interpretation, Theater, Radio and Television. All students planning to major in speech should elect Psychology 26 in their sophomore year. Required electives in other departments during the junior or senior year include English 55 and 68, and Philosophy 82.

Zoology

G. L. Woodside, *Adviser*

The courses in zoology have two major aims: (1) to offer students an opportunity to develop an understanding and appreciation of the scientific method as a part of a liberal education; and (2) to provide training for prospective graduate students in biology, medicine, dentistry, and related fields, as well as future teachers and laboratory technicians in the biological sciences.

The following courses are required of Zoology majors other than those planning to teach in high school: Zoology 1, 71, 72; Chemistry 1, 2, 29, 33 (or 51, 52); Physics 25, 26; a minimum of one from: Zoology 69, 70, 74, and Invertebrate Zoology at Woods Hole; a minimum of one from: Zoology 50, 53; a minimum of two from: Zoology 35, 83, 84.

The following courses are required of Zoology majors planning to teach in high school: Zoology 1, 25, 35; Botany 1, 25, 26; Chemistry 1, 2, 33; Physics 25, 26; Education 51 (junior year); concentrated semester block, Education 52, 85, 88 (senior year); Psychology 56; any fifteen junior-senior credits in Zoology as recommended by the special departmental adviser (especially recommended: Zoology 53, 54, 55, 56, 70, 74, 80 and 81); additional science credits, if desired, recommended from: Entomology 26, Bacteriology 31, Geology 28, Wildlife Management 27, Botany 81, Entomology 79, 90.

COLLEGE OF AGRICULTURE

DALE H. SIELING, *Dean*

The College of Agriculture with its several departments offers a broad general education with specific training in some phase of agriculture or horticulture. Upon the completion of the requirements for graduation, the student will have devoted about one-quarter of his time to pure science, one-quarter to social and humanistic studies, and about one-half to applied science and technology in agriculture and horticulture.

A broad choice of electives within the required courses of each curriculum gives the student the opportunity to prepare for (1) actual agricultural production; (2) research, teaching, or extension work; or (3) industrial work.

Each department of the school has specific requirements for graduation which are included in the descriptive matter under the name of the department. To prevent overspecialization, each student is required to elect at least 12 junior-senior credits in some other school of the University, one-half of these credits to be in the humanities and social sciences. At least 3 hours must be elected from the following: History 5, 6, 25, 26 or Government 25.

During the first semester of the freshman year, students interested in teaching vocational agriculture, extension work, or specializing in research work, should consult with the head of the department in which they plan to major.

The School comprises the following departments: Agricultural Economics and Farm Management, Agricultural Engineering, Agronomy, Dairy and Animal Science, Floriculture, Food Technology, Forestry and Wildlife Management, Landscape Architecture, Olericulture, Pomology, Poultry Science, and Veterinary Science. Students may major in any of these departments except Veterinary Science and Agricultural Engineering.

Curricula in Agriculture

Students majoring in Agricultural Engineering follow the program outlined on page 80. All other majors take the following curriculum during the first two years:

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
*Speech 3	2	*Speech 3	2
[1]Mathematics 7, Algebra and Trigonometry	3	[1]Mathematics 8 or 10	3
[2]Chemistry 1, General	3	[2]Chemistry 2, General	3
Botany 1, General	3	Zoology 1, General	3
Military 1 (men)	1	[3]Elective	3
Agriculture 1	3	Military 2 (men)	1
Physical Education 3 (men)	1	Physical Education 4 (men)	1
Physical Education 7 (women)	2	Physical Education 8 (women)	2

[1] Candidates for the Bachelor of Vocational Agriculture degree will take Government 25 and 26 in place of Mathematics.

Students who expect to take Calculus in the sophomore year should elect Mathematics 10.

[2] Those intending to major in Landscape Architecture and Landscape Operations, will take Chemistry 1 the first semester and Botany 1 the second semester. They may substitute a foreign language or History 5 and 6 for Zoology 1 and Chemistry 2.

[3] Students intending to major in Agricultural Economics, Floriculture, Food Management, Food Technology, Landscape Architecture and Landscape Operations, Olericulture, and Pomology will take Horticulture 2. Animal Husbandry and Dairy Technology majors will take Animal Husbandry 2. Forestry majors will take Forestry 26. Wildlife Management majors will take a year of foreign language in place of Agriculture 1 and Forestry 26. Students undecided as to major as well as those majoring in Agronomy and Poultry Husbandry will take History 6.

* May be taken either semester.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Econ. 25, Psych. 26 or Soc. 25	3	Econ. 25, Psych. 26 or Soc. 25	3
[1]A Science	3-4	[1]A Science	3-4
[2]Electives	6	[2]Electives	6
Military 25 (men)	1	Military 26 (men)	1
Physical Education 27 (women)	2	Physical Education 28 (women)	2
Physical Education 33 (men)	1	Physical Education 34 (men)	1

[1] To be selected from the following:

Bacteriology 31
Botany 25, 26, 28, 30
Chemistry 29, 30, 33
Geology 1, 28
Mathematics 29, 30
Physics 25, 26
Zoology 25, 35
Entomology 26
Civil Engineering 27

[2] The student will be guided in his selections by his major adviser.

JUNIOR-SENIOR CURRICULA

At the end of the sophomore year each student selects one of the following curricula as his major to complete his collegiate training.

Agricultural Economics and Farm Management

A. H. LINDSEY, *Adviser*

The department offers two curricula, one in Agricultural Economics and one in Farm Management, which have been designed to give the student a broad knowledge of the agricultural industry. Production economics, marketing and agricultural business management are the three main fields of study. Associated with these are training in farm policy, credit, cooperatives and land economics.

A student majoring in this department is prepared for positions with those industries and agencies which serve agriculture; vocational and extension teaching and government service; service or research positions in marketing, credit, or resource use. Agricultural Economics majors may specialize in four fields of study: animal products; fruits and vegetables; feeds and fertilizers; lumber merchandising. The major adviser will suggest supporting courses in these fields. The farm management curriculum stresses the economics of production and trains for managerial advisory work as well as for actual operation of farms.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Ag. Econ. 55, Mark'g Farm Products	3	Ag. Econ. 56, Prin. of Coop.	3
Ag. Econ. 57, Agric. Credit	3	[1]Statistics 79, Elementary	3
Business Law 70	3	Accounting 25	3
[1]Electives	6	Electives	6

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Ag. Econ. 89, Agric. Policy	2	Ag. Econ. 78, Land Econ.	3
Ag. Econ. 71, Ag. Econ. Theory	3	[1]Ag. Econ. 90, Agr. Institutions	2
Farm Management 75	3	Farm Management 76	2
[1]Electives	9	Electives	9

[1] Farm Management majors take Agronomy 51 in place of one elective junior year and Animal Husbandry 51 in place of one elective senior year. They take Agronomy 78 in place of Statistics 79 and Farm Management 84 in place of Agricultural Economics 90.

Agricultural Engineering

R. W. KLEIS, *Adviser*

Agricultural engineering is concerned with the application of scientific engineering principles to agricultural production and related agricultural industries. This professional field includes engineering activities related to the design, development and use of mechanical and electrical equipment; farm structures; and soil and water control systems for the production, processing and preserva-

tion of agricultural products and the improvement of rural living. Agricultural engineers are employed by a variety of agricultural industries and organizations for research, development, teaching, and promotional activities.

The program is designed to provide sound training for the agricultural engineering profession. The student majoring in this field will take his freshman and sophomore work at the University and then, under a cooperative agreement, complete his Bachelor of Science program at the University of Maine.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
Speech 3	2	Math. 6, Diff. Calculus	4
Math. 5, Analy. Geom.	4	Chem. 2 or 4, General	3
Chem. 1, General	3	Mech. Engin. 2, Drawing	3
Mech. Engin. 1, Drawing	2	Hist. 6 or foreign language	3
Hist. 5 or foreign language	3	Military 2	1
Military 1	1	Physical Ed. 4	1
Physical Ed. 3	1		

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Math. 32, Diff. Equations	4
Physics 27, General	4	Physics 28, General	4
Civil Engin. 31, Surveying	3	Psych. 26 or Soc. 25	3
Mech. Engin. 37, Engin. Mat'l.	3	Agric. Elective	3
Military 25	1	Military 26	1
Physical Ed. 33	1	Physical Ed. 34	1

SUMMER (6 Weeks)

Approved agricultural industry employment.

JUNIOR AND SENIOR YEARS

At the University of Maine.
(Consult Agricultural Engineering Department for details.)

Agronomy

W. G. Colby, *Adviser*

The courses are designed to give instruction concerning the basic knowledge of the soil and its management, fertilizers, and their uses as related to the principal products of the field. Crop improvement practices and the science of crop improvement are stressed for those who are interested in agronomy as a specialty.

There is sufficient flexibility within the curriculum to allow the student to specialize in soil science, plant science, soil conserva-

tion or general agronomy. Those students who have a desire to receive training which will qualify them for investigational work in these fields may obtain it by selecting appropriate supporting science or vocational subjects as electives. This training equips them to serve as specialists in one of these selected fields for industrial corporations and may serve also as training for extension or teaching work.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Agron. 57, Soil Formation	3	Agron. 58, Soil Utilization	3
Zoology 53, Genetics	3	Electives	9
Electives	6		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Agron. 51, Field Crops	3	Agron. 78, Fertilizer and Soil Fertility	3
Chem. 51, Organic	4	Chem. 52, Organic	4
Electives	9	Electives	9

Animal Husbandry

D. J. HANKINSON, *Adviser*

The animal husbandry curriculum is designed to provide the student with fundamental training in the physiology, breeding, nutrition, selection and management of farm animals. The curriculum is made flexible by permitting specialization in optional fields which prepare the student for positions in dairy cattle production and livestock production. An option is also available for those desirous of adequately preparing themselves for graduate work in animal science, including such specialized areas as animal nutrition, physiology or breeding.

Students who major in animal husbandry are required to take Animal Husbandry 51, 52, 65, 66, and Zoology 53 during junior year and Animal Husbandry 81 and 82 during senior year. They also must successfully complete one summer of Placement training before graduation, as well as the courses listed for one of the specialized fields of study below:

Dairy Production. Required courses: Agronomy 22; Animal Husbandry 26, 77, 78; Veterinary Science 75, 76; Dairy 25. Recommended: Animal Husbandry 33; Agronomy 52; Animal Husbandry 56 or 79; Agricultural Economics 75, 76.

Livestock Production. Required courses: Agronomy 22; Animal Husbandry 33, 56, 58, 79; Veterinary Science 75, 76. Recommended: Dairy 25; Agronomy 52; Animal Husbandry 77 or 78; Agricultural Economics 75, 76.

Animal Science. Required courses: Statistics 77; Math. 29, 30; Physics 25, 26; Zoology 87; two from Animal Husbandry 56, 77, 78, 79; one sequence of Chemistry 29, 30, 51, 52, 93, 94, or Chemistry 33, 79 and Zoology 71, 72.

Dairy Technology

D. J. HANKINSON, *Adviser*

Major students in dairy technology receive training in the testing, handling, and processing of milk, ice cream, butter, cheese, and other milk products. Practical application is made of chemistry, bacteriology, economics, and engineering in the many phases of dairy work.

Dairy technology graduates may secure responsible positions with commercial dairy manufacturing firms, or with equipment and supply firms. Opportunities are offered also for positions as teachers in high schools and colleges, for service in the fields of extension and research, and for sanitation and public health work with city, state or federal agencies.

Major students in dairy technology must successfully complete one summer of placement training in a dairy plant. It is recommended that this requirement be met during the summer immediately following the sophomore year of University residence.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Dairy 77, Butter and Cheese	4	Dairy 50, Judging	1
Chem. 51, Organic	4	Dairy 52, Mkt. Milk	4
Bact. 61, Public Health	3	Chem. 52, Organic	4
Electives	6	Electives	6

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Dairy 75, Chemistry	3	Dairy 78, Ice Cream	4
Dairy 79, Seminar	1	Dairy 80, Seminar	1
Bact. 81, Applied	3	Bact. 90, Sanitary	3
Agr. Engin. 80, Food Process Eng.	3	Electives	9
Electives	6		

Fisheries Technology

W. B. ESSELEN, *Adviser*

An optional curriculum in fisheries technology has been prepared by the Food Technology department. Excellent opportunities exist for employment by federal, state, and private industry in this rapidly expanding field.

Students taking this curriculum will following the regular Food Technology curriculum with certain substitutions and additions.

The department head should be consulted before the student begins his second year.

Floriculture

A. W. Boicourt, *Adviser*

The courses in floriculture provide for a comprehensive and detailed study of the practices and principles involved in the production, marketing and uses of cut flowers, flowering and foliage plants grown outdoors and under glass. Opportunities available to graduates may include: Positions in various fields of commercial floriculture, such as production, wholesale marketing and retailing; employment in nurseries, on private estates and in conservatories; positions in the professional field, including graduate study, teaching in colleges and secondary schools, research and extension work under state, federal, or other supervision.

It is advantageous for the student to determine, as soon as possible, the type of position for which he wishes to fit himself since the choice of elective courses will depend largely on his decision.

All major students in floriculture must successfully complete one summer of placement training in work related to their major objective and approved by the head of the department. It is recommended that this requirement for graduation be met during the summer following the freshman or sophomore year.

As sophomores majors are advised to take Chemistry 29 and Botany 26 for their sciences. First semester electives should be Botany 25 and Olericulture 25; second semester Entomology 26 and Floriculture 26.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Flori. 51, Greenhouse Mgt.	3	Flori. 52, Flower Arrangement	3
Flori. 79, Conservatory Plants or	2	Flori. 54, Greenhouse Const.	3
Flori. 81, Gardens and Borders	3	Plant Breeding 52, Methods	3
Zoology 53, Prin. of Genetics	3	Botany 52, Advanced Plant Pathology	3
Entomology 51, Pests of Special Crops	3	Electives	3
Botany 51, Plant Pathology	3		
Electives	2-3		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Flori. 75, Commercial	3	Flori. 76, Commercial	3
Flori. 79 or	2	Flori. 82, Seminar	3
Flori. 81	3	Botany 68, Physiology	3
Botany 67, Physiology	3	Electives	8
Electives	5-9		

Food Management

J. H. Baker, N. G. Cournoyer, *Advisers*

The curriculum in food management is offered as an option in the Food Technology department. The program is designed to give the student a general well-rounded background of arts and sciences, coupled with training in subjects useful to the hotel and restaurant industries. The nature of the food service industry requires persons with broad, general backgrounds of business training coupled with a scientific knowledge of foods.

In the sophomore year food management majors should take Food Management 33, Chemistry 33, and Accounting 25 the first semester and Home Economics 30, Bacteriology 31, and Accounting 26 the second semester.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Food Mgt. 67, Food Prep. & Serv.	3	Food Mgt. 68, Kitchen Adm.	3
Food Tech. 51, Introductory	3	Food Tech. 52, Food Prod.	3
*Dairy 25, General	3	Home Ec. 52, Nutrition & Diet	3
Accounting 63, Cost Acct.	3	An. Hus. 54, Meat Processing	2
†Electives	3	†Elective	5-6

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Food Tech. 71, Food Sci. Lit.	2	Food Tech. 72, Food Sci. Lit.	2
Food Mgt. 77, Food Service Prac.	3	Food Mgt. 78, Stewarding	3
Home Ec. 91, Quant. Food Prep. & Institutional Mgt.	3	Ind. Adm. 64, Personnel Mgt.	3
Poult. 75, Marketing Poult. Prod.	2	Bus. Law 70, Bus. Law I	3
†Electives	5	†Electives	4

† Suggested electives:

Dairy 52, 78
Economics 79
Finance 65
Home Economics 62
Speech 91
Journalism 85
Marketing 54
Olericulture 74
Public Health 61, 63

* An additional elective may be substituted for Dairy 25.

Food Technology

W. B. Esselen, A. S. Levine, *Advisers*

The department of food technology offers three curricula: Fisheries Technology (page 83), Food Management (page 85), and Food Technology.

The curriculum in food technology provides scientific and applied training in the principles concerned with the processing, preservation, and packaging of foods and food products. Both home

and commercial methods of food preservation are considered. Applied work includes canning, freezing, dehydration, fermentation and salting. Methods of manufacture of jams, jellies, fruit juices, and beverages are a part of the course work. An effort is made to apply the student's background in chemistry, physics, and bacteriology to food technology problems and food analysis.

The curriculum gives the student a broad science background with specialized knowledge in food processing and preservation. Special courses are offered for home economics majors who plan to teach or do extension work in foods. Major fields open to graduates include: (1) commercial work in cannery, freezer and other plant operations; (2) control and analytical work related to food products; (3) government food inspection and grading; (4) technological work in government, industry, and education.

Ambitious students are encouraged to acquire the background which will enable them to pursue graduate work and research in the application of scientific knowledge to the technology of foods.

The selection of supporting courses depends upon the objective of the student, which should be determined as early as possible.

Food technology majors should take Physics 25 and 26 and Chemistry 29 and 30 in the sophomore year; also, if possible, Bacteriology 31. Students planning to take Physical Chemistry should complete Mathematics 29 and 30.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Food Tech. 51, Introductory	3	Food Tech. 52, Food Prod.	3
Chemistry 51, Organic	4	Chemistry 52, Organic	4
Bacteriology 51	3	Bacteriology 82, Applied	3
Agr. Engin. 80, Food Eng.	3	Agr. Engin. 82, Refrigeration	2
Electives		Electives	

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Food Tech. 61, Industrial Technology	3	Food Tech. 62, Industrial Technology	3
Food Tech. 71, Food Science Literature	2	Food Tech. 72, Food Science Literature	2
Food Tech. 91, Analysis of Food Prod.	4	Food Tech. 92, Anal. Meth. & Instrumentation	4
Chemistry 79, Elem. Biol. or	4	Food Tech. 98, Sensory Evaluation	
Chemistry 65, Physical	3	Meth.	2
Electives		Electives	

SUGGESTED JUNIOR-SENIOR ELECTIVES

Public Health 61, 62, 63
A Foreign Language
Mechanical Engin. 1, 63
Dairy 75, 77, 52 or 78
Animal Husbandry 53
Poult. Husbandry 75
Olericulture 73, 74
Botany 66
Home Ec. 30, 52, 54
Food Tech. 85, 96
Chem. Engin. 77, 75
Indus. Engin. 25, 51

Forestry

A. D. Rhodes, *Adviser*

The technical curriculum in forestry is concentrated in the field of forest production and management, and leads to the degree of Bachelor of Science. It has professional status, being accredited by the Society of American Foresters. Graduates find good employment with federal and state agencies and in private industry. The curriculum emphasizes forest management and the production and harvest of wood crops.

The freshman and sophomore years are devoted to studies of basic sciences, English, and other subjects of cultural-foundational value. A required group of three courses—forest mensuration, forest harvesting, and plane surveying—is presented in a nine-weeks summer term immediately following the freshman year. Following the sophomore year qualified students are encouraged to undertake summer work giving practical field experience in forestry. Such employment may be with the United States Forest Service or other public and private agencies.

The forestry courses are open with few exceptions to students other than those concentrating in forestry but should be elected only after consultation with the student's major adviser and with the instructor teaching the course.

Sophomore majors in forestry take Forestry 25, Physics 25 and Geology 61 the first semester; Entomology 26, Physics 26, Botany 28 and Agronomy 22 the second semester.

SUMMER (Following Freshman Year)

Forestry 55, Forest Mensuration	Credit, 3
Forestry 78, Forest Harvesting	Credit, 3
Civil Engineering 27, Plane Surveying	Credit, 3

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Forestry 53, Silvics	3	Forestry 56, Prin. of Silviculture	3
Forestry 59, Protection	3	Forestry 54, Forest Soils	3
Forestry 75, Products	3	Entomology 72, Forest Ent.	3
History or Government 25	3	Psych. 26 or Soc. 25	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Forestry 81, Regional Silvicul.	3	Forestry 82, Seeding and Planting	3
Forestry 57, Forest Policy & Econ.	3	Forestry 80, Forest Mgt.	5
Forestry 71, Photogrammetry	3	Wildlife Mgt. 72, Forest-Animal Relationships	3
Botany 69, Forest Pathology	3	Electives	6
Electives	3		

Landscape Architecture

R. H. Otto, *Adviser*

Instruction in this department has two objectives: first a contribution to general education; second, a preparation of students for the practice of landscape architecture. The department offers optional curricula, (1) Professional Landscape Architecture, and (2) Landscape Operations.

The department also offers several elective courses in art (listed and described under Directory of Courses, page 121), which do not constitute a major. These courses are primarily cultural rather than technical and are intended to provide a better appreciation of the arts.

Students following this curriculum are prepared to take up work in landscape architecture, which leads through field experience or post-graduate study to permanent establishment in the profession.

Sophomores in the first semester elect either Botany 25 or Geology 1 for their science and take Landscape Architecture 25 and Civil Engineering 27 as electives. In the second semester the science is either Entomology 26 or Geology 28 and the electives Landscape Architecture 26 and 30.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Land. Arch. 51, Topography	3	Land. Arch. 52, Construction Design	3
Land. Arch. 53, Intro. Design	3	Land. Arch. 54, Gen. Design	3
Land. Arch. 59, Plant Mtls.	3	Land. Arch. 86, City Plan.	3
Land. Arch. 79, Const. & Maint. alternates with Land. Ach. 83, Architecture	3	Land. Arch. 60, Planting Design	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Land. Arch. 81, Adv. Design	3	Land. Arch. 88, Projects in Plan.	3
Land. Arch. 87, Projects in Plan.	3	Land. Arch. 82, Advanced Design	3
Land. Arch. 83, alternates with Land. Arch. 79	3	Land. Arch. 80, His. & Lit. of Land. Arch.	2
Electives	6	Electives	7

SUGGESTED ELECTIVES FOR JUNIOR AND SENIOR YEARS

Agronomy 2
Agrostology 53, 56
Civil Engin. 90
Agri. Engin. 51
Sociology 51
Floriculture 52, 81
Philosophy 82
Art 33, 34, 75, 78
Land. Arch. 84, 85

Landscape Operations

The curriculum in landscape operations offered by the department of landscape architecture is suggested for those preferring to following the horticultural phase of landscape including (1)

nursery practice; (2) landscape planting and construction; and (3) maintenance of landscaped areas, such as parks and semi-public institution grounds.

Sophomores in this major will take Botany 25, Civil Engineering 27, Landscape Architecture 25 in the first semester; Entomology 26, Floriculture 26, and Landscape Architecture 30 in the second.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Land. Arch. 59, Plant Materials	3	Land. Arch. 60, Planting Design	3
Land. Arch. 51, Topography	3	Land. Arch. 52, Constr. Details	3
Land. Arch. 53, Intro. Design	3	Pomology 26, Small Fruits	3
Landscape Arch. 79, Constr. & Maint.	3	Land. Arch. 54, Gen. Design	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Flori. 81, Herbaceous Borders	3	Agrostology 56, Turf Mgt.	3
Agrostology 53, Turf Grasses	3	Pomology 56, Orchard Pest Control	3
Zoology 53, Genetics	3	Plant Breeding 52, Methods	3
Ent. 51, Pests of Sp. Crops	3	Electives	6
Botany 51, Plant Pathology	3		

SUGGESTED ELECTIVES FOR JUNIOR AND SENIOR YEARS

Botany 67, 68, 81
Entomology 72
Agronomy 78
Forestry 56

Olericulture

G. B. Snyder, *Adviser*

The courses in olericulture provide a basic training in the scientific principles and applied practices relative to the culture and marketing of vegetable crops. The major courses prepare students for the operation of commercial vegetable farms; for high school, college, and federal work in teaching, research and extension; for state, federal and private produce inspection work; for various opportunities in the retail and wholesale marketing of perishables; and as service men, specialists, and managers in industrial fields allied to the vegetable industry.

The rather broad objectives of the training means that the selection of supporting courses depends upon the specific field in which the student wishes to engage on graduation. This objective should, therefore, be determined as early as possible during the sophomore year.

Majors in olericulture should take the following courses during the first semester of the sophomore year: Botany 25 or Geology 1

and Olericulture 25. In the second semester they should include Chemistry 29, Entomology 26, and Pomology 26.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Oleri. 51, Nutr. of Veg. Crops	3	Oleri. 52, Comm. Veg. Prod.	3
Zoology 53, Genetics	3	Botany 68, Plant Physiology	3
Botany 51, Plant Pathology	3	*Electives	9-11
Botany 67, Plant Physiology	3		
*Electives	5		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Oleri. 73, Prod. Marketing Practices	3	Oleri. 74, Merchandising of Perishables	3
Oleri. 75, Systematic	4	Oleri. 80, Sp. Problems	3
Entomology 51, Pests of Special Crops	3	*Electives	9-11
*Electives	5-7		

* Suggested electives:

Agric. Ec. 55, 75, 76
Agron. 78
Botany 58
Bacteriology 56
Chem. 33, 79
Plant Breed. 52
Agric. Engin. 72, 82
Flori. 54
Food Tech. 51, 75

Pomology

A. P. FRENCH, *Adviser*

The pomology courses provide a comprehensive training in the scientific and commercial principles concerned in the growing and marketing of apples, pears, peaches, plums, cherries, and small fruits. Major fields open to graduates include: (1) practical work in connection with the operation of fruit farms; (2) teaching in college, high school, or secondary schools of agriculture; (3) extension work in county, state, or nation; (4) research work with state, federal or private concerns; and (5) commercial work in connection with the manufacture and sale of such supplies as machinery, packages, and spraying and dusting materials. Certain supporting courses are required and their selection depends upon the objective of the student. That objective should, therefore, be determined as early as possible.

An optional curriculum in cranberry technology is offered by the department and is designed to provide a broad training in the fields of knowledge which serve as the foundation of the cranberry industry. Its purpose is to provide future leaders and specialists for the industry.

Sophomores are advised to elect Geology 1, Chemistry 29, and Pomology 25 in the first semester; in the second semester they should take Agronomy 22, Entomology 26, and Pomology 26.

Two separate curricula are offered during junior and senior year: one for pomology majors and one for majors in cranberry technology.

Pomology majors follow the curriculum outlined below. The student who wishes to do college teaching, extension work, or research is advised to secure a broad foundation in science and liberal arts, and to plan to enter a graduate school sooner or later. The student whose objective is growing fruit or teaching in a secondary school may need to broaden his training in horticulture and agriculture and will need also all the science and liberal arts courses that can be included in the program. Students majoring in Pomology must successfully complete one summer of placement training on a fruit farm before the beginning of the senior year.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Pomology 79 or 81, Advanced	3	Pomology 56, Orchard Pest Control	3
Pomology 75, Systematic or	4	Botany 68, Plant Physiology	3
Pomology 77, Fruit Mktg.	3	Botany 30, Plant Anatomy	3
Botany 51, Plant Pathology	3	Electives	6
Botany 67, Physiology	3		
Elective	3		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Pomology 79 or 81, Advanced	3	Pomology 84, Problems	3
Pomology 75, Systematic or	4	Olericulture 74, Merch. of Perish.	3
Pomology 77, Fruit Mktg.	3	Electives	12
Zoology 53, Genetics	3		
Electives	7		

Majors in cranberry technology will take the following curriculum. They also must satisfactorily complete a minimum of two summers' practical experience in the cranberry industry before the beginning of the senior year.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Chem. 33	3	Pomology 56, Spraying	3
Botany 51, Plant Pathology	3	Ag. Econ. 26, Ag'l Prod.	3
Ent. 51, Pests of Special Crops	3	Electives	
Electives			

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Bot. 67, Plant Psychology	3	Bot. 68, Plant Physiol.	3
Ag. Econ. 55, Marketing	3	Ag. Econ. 56, Cooperation	3
Pom. 85, Cranberry Prob.	2	Pom. 86, Cranberry Prob.	2
Electives		Electives	

Poultry Husbandry

T. W. Fox, *Adviser*

The department gives instruction in the science, art and practices of poultry keeping; not only to students specializing in this department, but also to those in other departments who desire supporting work in poultry husbandry. The major courses prepare men for the successful operation of commercial poultry and breeding farms and hatcheries either as owners or managers; for high school, college and federal work in teaching, extension and research; and as service men, specialists and managers in industrial fields allied to the poultry industry.

Students must successfully complete one summer of placement training on a poultry farm or in some business allied to poultry.

Sophomores may choose electives from the list of sophomore sciences or Dairy 25, Animal Husbandry 26, Agricultural Economics 26, Olericulture 25, Pomology 26, Floriculture 26, or Wildlife Management 27.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Poultry Husb. 55, Housing and Sanitation	2	Poultry Husb. 52, Incubation and Brooding	3
Poultry Husb. 53, Judging	3	Poultry Husb. 56, Nutrition	3
Zoology 53	3	Electives	
Electives			

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Poultry Husb. 75, Marketing	2	Poultry Husb. 78, Seminar and Farm Management	3-4
Poultry Husb. 77, Breeding	3	Poultry Husb. 76, Turkey Prod.	2
Vet. Sci. 75, Comp. Vet. Anat.	3	Vet. Sci. 88, Avian Path.	3
Electives		Electives	

Veterinary Science

Though major work in Veterinary Science is not available, the department does offer supporting courses to assist students who expect to enter the various fields of agriculture, wildlife management, public health, teaching and laboratory work in the biological sciences or veterinary medicine.

Wildlife Management

R. E. TRIPPENSEE, *Adviser*

The courses in conservation and wildlife management offered by the department of forestry and wildlife management are designed for those who desire a general understanding of the renewable natural resources as well as those who expect to make a living in the professional field of wildlife management. Courses are available also to students who expect to major in other fields including agriculture, agronomy, economics, forestry, entomology, and education.

Wildlife management is both an applied science and an art and is concerned with the production and control of animal populations on many types of land including farms, forests, and on waste lands and water areas. Thus an understanding of both the origin and management of land and water is necessary. These background phases include geology, agronomy, forestry, and agriculture. Fields of specialization include fisheries management, game, and furbearer management and control of injurious animals, and related fields such as soil conservation, conservation education, and industrial biology.

Studies in wildlife management are closely correlated with the work of the State Conservation Department and the U. S. Fish and Wildlife Service. During the junior and senior years trips are planned to the bait-mixing station of the U. S. Fish and Wildlife Service, the John C. Phillips Wildlife Laboratory at Upton, Mass. and to numerous wildlife projects in the state. Students are urged to attend the northeastern and the American wildlife conferences.

Graduates in this field are eligible to both state and federal civil service examinations, and most of the permanent job opportunities are in public service either with the state or federal government. A limited number of positions are open in private enterprises. Training in the wildlife field is an excellent background for teaching of science in the public schools and for employment as conservation officers. Much research data and many research operations are available to undergraduates through the Massachusetts Cooperative Wildlife Research Station, and students with sufficiently high grades are eligible for graduate work at other universities.

The courses during the first two years are basic educational subjects required to build a background of sound professional training. Sophomores are expected to take Geology 1, Zoology 35, Wildlife Management 27, Agronomy 22, Entomology 26, and Forestry 26. During junior and senior years major students take Wildlife Management 70, 71, 74, 75 and 84, and Forestry 55, 56, and 71.

SCHOOL OF BUSINESS ADMINISTRATION

H. B. Kirshen, *Dean*

The School of Business Administration offers preparation to students to enable them to take advantage of important economic opportunities and eventually to assume positions of responsibility in business. The School's educational program is directed toward the professional aspects of business, encouraging high standards of ethical conduct, broad social responsibilities and the development of competence in particular courses of study of the student's own interest, aptitude and choice.

The first two years emphasize general education by providing fundamental courses in the humanities, mathematics, science and social science. In addition, basic courses in accounting and economics prepare the student for further work in the School of Business Administration. The first two years are largely prescribed.

The junior and senior years emphasize a greater degree of specialization and provide for this in the programs indicated below. But even in these last two years all students need to view business as a whole in so far as a "core" of courses can do this. All students are required to complete specified courses in Management in Industry, Financial Institutions, Marketing Principles, Corporation Finance, Elementary Statistics and Business Law.

Each course of study leads to the degree of Bachelor of Business Administration.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
*Speech 3	2	*Speech 3	2
Industrial Adm. 11, Indust. Geography or Foreign Language	3	Economics 12, Ec. Hist of U. S. or Foreign Language	3
Mathematics 1, 5, or 7	3	Mathematics 2, 4, 6, 8, or 10	3
Government 25, American	3	History 6, Mod. European Civ.	3
Elective, Science	3	Elective, Science	3
Military 1	1	Military 2	1
Physical Ed. 7 (women)	2	Physical Ed. 8 (women)	2
Physical Ed. 3 (men)	1	Physical Ed. 4 (men)	1

* May be taken either semester.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Economics 25, Elements	3	Economics 26, Prob. of Nat'l Economy	3
Accounting 25, Introduction I	3	Accounting 26, Introduction II	3
Psychology 26, General	3	Sociology 25, Introduction to	3
Elective	3	Elective	3
Military 25	1	Military 26	1
Physical Ed. 33 (men)	1	Physical Ed. 34 (men)	1
Physical Ed. 27 (women)	2	Physical Ed. 28 (women)	2

JUNIOR-SENIOR CURRICULA

General Business Management

This program is designed for those students more interested in the broader administrative aspects of business than in a more specialized program.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
I. A. 63, Mgt. in Industry	3	Fin. 65, Corporation Finance	3
I. A. 65, Prin. of Transportation	3	Fin. 76, Insurance	3
Mkt. 53, Marketing Principles	3	Stat. 79, Elem. Ec. Stat.	3
Fin. 55, Financial Institutions	3	Ec. 56, Business Fluctuations	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Bus. Law 70, Bus. Law I	3	Bus. Law 72, Bus. Law II	3
Ec. 73, Modern Econ. Theory	3	I. A. 80, Adm. Procedure	3
Ec. 79, Labor Problems	3	Ec. 78, Public Finance	3
Elective in Business	3	Elective in Business	3
Elective	3	Elective	3

Accounting

Accounting deals with the problems of measuring, recording, reporting and interpreting business transactions. This program is for the student who wishes to prepare for employment as auditor, controller, cost analyst, industrial accountant, public accountant, or teacher of accounting.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Acct. 61, Intermediate Accounting	3	Acct. 62, Advanced Accounting	3
Acct. 63, Cost Acct.	3	Fin. 65, Corporation Finance	3
Fin. 55, Financial Institutions	3	Stat. 79, Elem. Ec. Stat.	3
Mkt. 53, Marketing Principles	3	Elective in Acct.	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Acct. 73, Fed. Income Tax Procedure	3	Bus. Law 72, Bus. Law II	3
Bus. Law 70, Bus. Law I	3	Fin. 82, Investments	3
I. A. 63, Management in Industry	3	Ec. 78, Public Finance	3
Elective in Acct.	3	Electives	6
Elective	3		

Finance

Courses in banking, finance and insurance are provided for students who expect to assume responsibility for financing a business or to work for banks, investment institutions, brokerage houses, insurance companies, or governmental agencies concerned with finance.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Fin. 55, Financial Institutions	3	Bus. Law 70, Business Law I	3
Fin. 65, Corporation Finance	3	Ec. 56, Business Fluctuations	3
I. A. 63, Management in Industry	3	Stat. 79, Elem. Ec. Stat.	3
Mkt. 53, Marketing Principles	3	Elective in Business	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Fin. 81, Prob. of Bus. Finance	3	Fin. 76, Insurance	3
Ec. 73, Modern Economic Theory	3	Fin. 82, Investments	3
Ec. 79, Labor Problems	3	Ec. 78, Public Finance	3
Electives	6	Electives	6

Industrial Administration

Industry offers to qualified students an opportunity to find satisfying careers in industrial management, or personnel management. The program offered is designed to give the student specialized training in these fields and a comprehensive understanding of the problems of industrial enterprises.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Acct. 63, Cost Acct.	3	I. A. 63, Mgt. in Indus.	3
I. A. 65, Prin. of Transportation	3	I. A. 64, Personnel Management	3
Fin. 55, Financial Institutions	3	Bus. Law 70, Bus. Law I	3
Mkt. 53, Marketing Principles	3	Stat. 79, Elem. Ec. Stat.	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
I. A. 73, Problems in Industrial Management	3	Acct. 72, Adm. Acct. & Contr.	3
Fin. 65, Corporation Finance	3	I. A. 80, Administrative Procedure	3
Ec. 79, Labor Problems	3	Mkt. 76, Purchasing	3
Electives	6	Psych. 86, Industrial Psychology	3
		I. E. 88, Motion & Time Study	3

Management Training

A curriculum in Management Training for young women has been approved and is being developed.

Marketing

Students in marketing prepare for a variety of occupations in wholesale and retail enterprises and the sales activities of manufacturers. The program offers specialized study of basic types of market operations.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Mktg. 53, Marketing Principles	3	Mktg. 54, Salesmanship & Sales Mgt.	3
Fin. 55, Financial Institutions	3	Mkgt. 62, Market Research	3
I. A. 63, Management in Industry	3	Stat. 79, Elem. Ec. Statistics	3
I. A. 65, Prin. of Transportation	3	Bus. Law 70, Bus. Law I	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Mkt. 71, Retail Merchandising	3	Mkt. 80, Problems in Mgt.	3
Mkt. 73, Advertising	3	Mkt. 76, Purchasing	3
Ec. 79, Labor Problems	3	Psych. 86, Industrial Psychology	3
Ec. 73, Modern Ec. Theory	3	Elective in Business	3
Elective	3	Elective	3

Merchandising

This program has been planned to meet the growing demand for women with technical training to fill positions of responsibility in retail merchandising.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Mkt. 53, Marketing Principles	3	Mkt. 62, Market Research	3
Ec. 55, Ec. of Consumption	3	I. A. 64, Personnel Management	3
Fin. 55, Financial Institutions	3	Home Ec. 4, Textiles	3
Elective in Business	3	Elective in Business	3
Elective	3	Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Mkt. 71, Retail Merchandising	3	Mkt. 80, Marketing Problems	3
Mkt. 73, Advertising	3	B. L. 70, Business Law I	3
Home Ec. 35, Tailoring or Clothing Construction	3	H. Ec. 62, Home Furnishing	3
Elective in Business	3	Elective in Business	3
Elective	3	Electives	3

SCHOOL OF EDUCATION

A. W. Purvis, *Dean*

The School of Education through its undergraduate program seeks to utilize the forces of the University to prepare teachers for elementary and secondary schools and through its graduate offering to prepare administrators and specialists in public education. Its program is based upon the assumption that teachers and other school personnel should have a broad liberal education, considerable mastery of at least one field, and professional courses which should lead to a knowledge of the persons to be taught, familiarity with the problems to be met, and practice in the best techniques of teaching and supervision. In all of this the School of Education takes the position that teacher training is a University function and that success will come only if the School is successful in maintaining the closest possible relationships with other schools and departments that contribute to the program.

All students who contemplate teaching as a career should register early, in their freshman year if possible, with the School of Education although their courses in education do not begin until the junior year. In general, students are admitted without question to the various service courses of the junior and senior years, but admission to the teacher-training program of the concentrated semester block is determined by a composite rating based on scholarship as shown by University grades (a three-year average at least as high as the University median is desired), success in the beginning courses in education, recommendations of University teachers in general education fields, and personality ratings by members of the staff.

Elementary School Teaching

Candidates for this program major in elementary education. In certain cases, with the approval of the Dean of the School of Education, the student may be permitted to major in some other school or department where the general education program is deemed the equivalent of that for elementary education majors. Such students will satisfy the requirements of their major department so far as the first two years are concerned but they should schedule the core professional program for elementary education majors (including the concentrated elementary block) in the junior and senior years.

Students with a major in Elementary Education take the following courses:

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1	2	English 2	2
*Speech 3	2	*Speech 3	2
Math. 1	3	Math. 2 or 4	3
Zool. 1 or Bot. 1	3	Bot. 1 or Zool. 1	3
Foreign Lang.	3	Foreign Lang.	3
History 5	3	History 6	3
Military 1 (men)	1	Military 2	1
Phys. Ed. 3 (men)	1	Phys. Ed. 4 (men)	1
Phys. Ed. 7 (women)	2	Phys. Ed. 8 (women)	2

* May be taken either semester.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Psychology 26	3	Sociology 25 or Econ. 25	3
*Science	3 or 4	Zool. 54	3
Government 25	3	Music 51 or Art 78	3
*Elective	3	*Elective	3
Military 25 (men)	1	Military 26 (men)	1
Physical Ed. 33 (men)	1	Physical Ed. 34 (men)	1
Physical Ed. 27 (women)	2	Physical Ed. 28 (women)	

* To be chosen from sophomore courses in the College of Arts and Sciences. History 25, 26 is required. It may be taken as a sophomore elective or in the junior year.

JUNIOR AND SENIOR YEARS

During junior year the student takes History 25 and 26 (if not taken previously), Education 51 and 64 and Psychology 94 or Home Economics 70. One semester of senior year is devoted to the concentrated Elementary Block (Ed. 60, 61, 62, 85). Majors will be expected to utilize their junior and senior electives to develop a minor of at least fifteen hours in a general education field.

Secondary School Teaching

All candidates for secondary school teaching will major in the subject field to be taught and minor in education. A maximum of eighteen hours should be taken in this minor. Education 51 and Psychology 56 are required during junior year and Education 52, 88, 85 (called the secondary block) in one semester of senior year. Since the concentrated semester block in secondary school teacher-training carries only twelve credits students should consult with their major adviser regarding means of making up the extra three credits, and of meeting all their major requirements in the three semesters of junior and senior years.

Special Field Programs for Prospective Teachers

In Vocational Agriculture (C. F. Oliver, adviser). This program is based on a cooperative agreement between the University and the Vocational Division of the State Department of Education which provides supervisors and consultants in conducting the program. Students otherwise qualified may prepare to teach vocational agriculture by the satisfactory completion of Education 72, 73, and 75. Education 52 is also recommended. To insure a desirable range of preparation, students who contemplate vocational teaching should consult, early in the freshman year if possible, Professor Oliver and Mr. Taft.[1] A vocational teacher-training certificate is awarded by the Vocational Division to those who fully qualify.

In Home Economics (Miss Strattner, adviser). These students will major in home economics and minor in education. They should elect Education 51, Psychology 56, Home Economics 81 and the concentrated semester block (Education 52, 85).

In Teacher Coaching (S. W. Kauffman, adviser). These students will major in physical education and minor in education. They should elect Psychology 56 and the concentrated semester block (Education 52, 88, 85). They should elect a minor teaching field from the College of Arts and Sciences consisting of a minimum of eighteen hours.

In Music (D. Alviani, adviser). These students will major in music and minor in education. They should elect Education 51, Psychology 56, and the concentrated semester block (Education 52, 88, 85).

[1] Mr. J. A. Taft is State Supervisor for Agricultural Teacher-Training representing the Vocational Division of the State Department of Education in the administration of vocational agricultural acts.

SCHOOL OF ENGINEERING

G. A. MARSTON, *Dean*

The departments of chemical engineering, civil engineering, mechanical engineering and electrical engineering comprise the School of Engineering. Each department offers a curriculum leading to a Bachelor of Science degree in that particular branch. An optional curriculum in industrial engineering is offered in the mechanical engineering department.

The civil, electrical, mechanical, and the industrial optional curricula have been accredited by the Engineers Council for Professional Development.

Engineering can be defined as the combination of science and art by which materials and power are made useful to mankind. An engineer requires intensive technical training but at the same time he should acquire the broad education that distinguishes the professional man from the technician. His education does not end with formal schooling but continues throughout his life as he accumulates experience.

The curricula in engineering have been carefully prepared to offer each student the opportunity to acquire a sound training in the fundamental work of the various branches of his chosen field. At the same time he receives a thorough training in the sciences and mathematics, which are the important tools of the engineer. About twenty percent of his time is devoted to the social and humanistic studies. Some opportunity to pursue his particular interest is offered in the senior year.

The curriculum of the freshman year is the same for all. Specialization to a limited extent begins in the sophomore year.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English I, Composition	2	English 2, Composition	2
Speech 3	2	Mathematics 6, Diff. Calculus	4
Mathematics 5, Analytical Geom.	4	Chem. 2 or 4, General	3 or 4
Chem. 1, General	3	Mechanical Engr. 2, Drawing	3
Mechanical Engineering 1, Drawing	2	*Hist. 6 or foreign language	3
*Hist. 5 or foreign language	3	Military 2	1
Military 1	1	Physical Ed. 4	1
Physical Ed. 3	1		

* French or German recommended for Chem. Eng. majors.

SOPHOMORE-JUNIOR-SENIOR CURRICULA

Majors in Engineering will select one of the following curricula.

Chemical Engineering

E. E. LINDSEY, *Adviser*

Chemical Engineering is that branch of engineering concerned with the development of manufacturing processes in which chemical or certain physical changes of materials are involved. These processes may usually be resolved into a coordinated series of unit operations (physical changes) and unit processes (chemical changes). The work of the chemical engineer is primarily concerned with the design, construction, and operation of equipment and plants in which series of these unit operations and processes are applied. Chemistry, physics, and mathematics are the underlying sciences of chemical engineering, and economics is its guide in practice.

Chemical engineers are employed not only in these industries manufacturing chemicals but in many others where there occur chemical changes and physical changes other than forming and shaping which is the province of mechanical engineering. Examples are: petroleum refining, coal processing, refractories and clay products, cement, waste treatment, pulp and paper, rayon and textiles, paint and varnish, natural and synthetic rubber, foods, leather, plastics, soap, penicillin and other antibiotics. Much of the work of the atomic energy program is chemical engineering. The types of work done by chemical engineers include: design, construction, research, development, production, financial and patent appraisal, management, and sales.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Chem. Engin. 25	2	Chem. 30, Quantitative Analy.	4
Chem. 29, Qualitative Analy.	4	Physics 28, General	4
Physics 27, General	4	Math. 32, Diff. Equations	4
Math. 31, Applied Calculus	4	English 26, Humane Letters	3
English 25, Humane Letters	3	Chem. Engin. 26, Calculations	2
Military 25	1	Military 26	1
Physical Education 33	1	Physical Education 34	1

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Chemistry 51, Organic	4	Chemistry 52, Organic	4
Chemistry 65, Physical	4	Chemistry 66, Physical	4
Civil Engin. 34, Statics	3	Civil Engin. 53, Strength of Mat.	3
Chem. Engin. 55, Unit Opera. I	5	Chem. Engin. 56, Unit Opera. II	5
[1]Economics 25, Elements	3	[1]Psych. 26 or Sociology 25	3

SUMMER (6 Weeks)

Chem. Engin. 75, Instrumentation	3	Chem. Engin. 88, Chem. Engin. Lab.	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Chem. Engin. 81, Heat-Energy Rel.	3	Chem. Engin. 82, Ind. Equil. & Kinetics	3
Chem. Engin. 93, Comprehen. Prob.	3	Chem. Engin. 94, Comprehen. Prob.	3
Chem. Engin. 91, Seminar	1	Chem. Engin. 92, Seminar	1
Elec. Engin. 63, Elements	3	Elec. Engin. 64, Indus. Applic.	3
Chem. Eng. 89, Lab. Projects	3	[1]Electives	6
[1]Electives	6		

[1] Of the 12 elective credits, six must be in Liberal Arts courses and six from Engineering, Science, Honors Work, English 83, or Business Law 70, except for advanced military students who will defer Economics 25, Psychology 26 or Sociology 25 to senior year in place of two of their electives, and take advanced military courses as their 12 elective credits.

Civil Engineering

M. P. White, *Adviser*

Civil engineering is concerned with structures, transportation, movement of fluids, use and storage of water, sanitation, and surveying and mapping. A civil engineer may be engaged in research, in planning and designing, in construction, or in maintenance and operation. Consequently, civil engineering contains room for a wide range of interests—from highly theoretical to very practical.

The curriculum gives a thorough training in the fundamental sciences and at the same time prepares a student for work in any branch of civil engineering. During his senior year a student takes two or three elective technical courses, allowing him to specialize to some extent in whatever branch of civil engineering is most interesting to him—sanitation, mechanics and structures, hydraulics, foundation engineering, highway engineering.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Physics 28, General	4
Physics 27, General	4	Elec. Engin. 63, Elements of	3
Civ. Engin. 31, Surveying I	3	Civ. Engin. 32, Surveying II	3
Civ. Engin. 34, Statics	3	Civ. Engin. 52, Dynamics	3
Military 25	1	Military 26	1
Phys. Ed. 33	1	Phys. Ed. 34	1

SUMMER (6 Weeks)

Civ. E. 28, Prop. & Topog. Surveying	3	Civ. Eng. 30, Route Surveying Practice	3

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Psych. 26, Econ. 25 or Soc. 25	3	Econ. 25, Psych. 26 or Soc. 25	3
Civ. Eng. 51, Strength of Mat'ls	4	Civ. Eng. 70, Theory of Structures	4
Civ. Eng. 55, Transportation Engin.	3	Civ. Eng. 61, Testing Mat'ls.	2
Civ. Eng. 75, Fluid Mech.	3	Civ. Engin. 80, Soil Mechanics	3
Mech. Eng. 61, Heat Power*	3	Mech. Engin. 39, Mat'ls. of Constr.*	2
Geol. 50, Engin. Geol.	3	Math. 32, Diff. Equations	4

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Civ. Eng. 71, Structural Design	3	Civ. Eng. 78, Sanitary Engin. II	4
Civ. Eng. 73, Reinforced Concrete Design	4	Civ. Eng. 90, Contracts, Specif. & Est.	3
Civ. Engin. 76, Fluid Mech. Lab.	1	Civ. Eng. 92, Professional Sem.	1
Civ. Eng. 77, Sanitary Engin. I	3	Technical Electives (Civ. Eng. 72, 82, 86, 88, 94, 96, 98, recommended)	6
Civ. Eng. 81, Foundations	3		
English 83, Technical Writing	2		
Non-Tech. Elective*	3	Non-Tech. Elective*	3

* Replaced by military for military majors.

Electrical Engineering

C. S. Roys, *Adviser*

Electrical engineering is that branch of the profession covering the engineering applications of electricity. It reaches into practically every profession, every branch of activity, either through performance of the tasks involved, or through their measurement and control. Because it is so diversified in its applications, it is considered to be divided into various fields such as power, communications, electronics, illumination, measurements and control and others, each of these having specialized subdivisions.

The undergraduate curriculum is designed to prepare the student for work in any of these fields, and to serve as a basis for specialization in any of them, either in advanced courses or in the field. At the same time, about one-fifth of the student's work is devoted to the humanistic-social courses so that he may have an understanding of the broader aspects of engineering and its relation to other fields of human endeavor.

SUMMER (Following Freshman Year)

Mechanical Engineering 23, Shop, 3 credit hours.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Math. 32, Diff. Equations	4
Physics 27, General	4	Physics 28, General	4
Elec. Engin. 41, Fundamentals	4	Civ. E. 34, Statics	3
Military 25	1	Elec. Engin. 42, A-C. Circuits	3
Physical Ed. 33	1	Military 26	1
		Physical Ed. 34	1

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Elec. Engin. 53, D-C. Machinery	4	Elec. Engin. 54, A-C. Machinery	4
Elec. Engin. 55, Electronics	3	Elec. Engin. 56, Appld. Electrn.	4
Elec. Engin. 57, Engin. Analysis	3	Elec. Engin. 58, Elec. Trans.	3
Mech. Engin. 65, Heat Engin. I	3	Mech. Engin. 66, Heat Engin. II	3
Civ. Engin. 52, Dynamics	3	Civ. Engin. 53, Strength of Mat.	3
**Econ. 25, Psych 26, or Soc. 25	3	♯English 83, Tech. Writing	2

SUMMER

Elec. Engin. 85, Electrical Measurements, 3 credit hours.

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Elec. Engin. 83, Transient Analysis	4	Elec. Engin. 92, Prof. Seminar	1
Ind. Engin. 86, Ind. Mgt.	3	♯Mech. Engin, 37, Basic Engin. Mat'l.	3
♯Mech. Engin. 81, M. E. Lab. I	2	Econ. 25, Psych. 26 or Soc. 25	3
Civ. Engin. 75, Fluid Mechanics	3	Technical Elective (Elec. Engin. 78, 80, 84, 86, 90, 94, 96, 98)	6 to 8
Technical Elective (Elec. Engin. 78, 79, 81, 87)	4		
Non-Tech. Elective*	3	Non-Tech. Elective*	3

* Recommended as non-technical electives; Govt. 26, Bus. Law 70, Psych. 86.

♯ Not required of advanced military students.

** Postponed to senior year replacing non-technical elective for advanced military students.

Mechanical Engineering

W. H. Weaver, *Adviser*

Mechanical engineering is that branch of the profession which, broadly speaking, covers the fields of heat, power, design of machinery, industrial management and manufacturing problems.

Building upon the foundation laid by the departments of mathematics, physics, and chemistry, the department of mechanical engineering undertakes to show the student how fundamental physical laws apply to this field of the profession. The courses selected give the student thorough training in the basic principles so that particular applications can be mastered in professional practice. Therefore, no attempt is made to give highly specialized instruction.

It must be realized that the modern engineer lives in a time of rapid social and technological change. Only the man who has had a well-balanced cultural and technical program of study can adjust quickly enough to the needs of a continually changing social order. The following curricula emphasize the fundamentals of the four M's of engineering: materials, methods, men, and money, a knowledge of which is vital to the modern engineer.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Math. 31, Integ. Calculus	4	Math. 32, Diff. Equations	4
Physics 27, General	4	Physics 28, General	4
Mech. Eng. 37, Basic Engin. Mat'l.	3	Civ. Eng. 34, Statics	3
Ind. Engin. 25, Prod. Processes	2	Mech. Eng. 46, Fund. of Metallurgy	3
Military 25	1	Military 26	1
Physical Ed. 33	1	Physical Ed. 34	1

SUMMER (Following Sophomore Year)

Mechanical Engineering 27 and 28, Shop, 6 credit hours.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
♯English 83, Tech. Writing	2	♯Psych. 26, Econ. 25 or Soc. 25	3
Civ. Engin. 52, Dynamics	3	Civ. Engin. 75, Fluid Mech.	3
Mech. Eng. 63, Eng. Thermo-dynamics I	4	Civ. Engin. 76, Fluid Mech. Lab.	1
Elec. E. 61, Principles	4	Mech. Eng. 68, Kinematics	3
Civ. Eng. 51, Strength of Mat'ls.	4	Mech. Eng. 64, Eng. Thermo-dynamics II	3
Civ. Eng. 61, Testing of Mat'ls.	2	Mech. E. 67, Mech. Instr. Lab.	1
		Elec. Eng. 62, Principles	4

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Mech. Eng. 87, Engin. Thermo. III	3	Psych. 26, Econ. 25 or Soc. 25	3
Mech. Eng. 79, Mech. Eng. Lab.	1	Mech. E. 80, Mech. Eng. Lab.	2
Mech. Eng. 83, Machine Design	3	Mech. E. 82, Heat Transfer or Mech. E. 84, Basic Engin. Analysis	3
Mech. Engin. 85, Dynamics of Mach.	4	♯Technical Elect.†	3
Mech. Eng. 91, Sem.	1	♯Non-Tech. Elect.	3
♯Technical Elect.†	3		
♯Non-Tech. Elective	3		

♯ Advanced military students take military in place of English 83 and Econ. 25, Psych. 26 or Soc. 25 during junior year. During senior year they take military and Econ. 25, Psych. 26 or Soc. 25 in place of the technical and non-technical electives.

† Technical electives: Mech. Engin. 74, 75, 76, 77, 82, 84, 88, 90, 94; Ind. Engin. 86; Elec. Engin. 64; Civ. Engin. 88.

Industrial Engineering Option

W. H. Weaver, *Adviser*

Industrial engineering is concerned with the engineering aspects of the organization, operation and management of manufacturing plants. It is based on the premise that the operation of a manufacturing plant is fundamentally an engineering activity. Consequently, the industrial engineering curriculum is built on a foun-

dation of mechanical engineering. To the technical knowledge and scientific attitude developed through the study of engineering is added the study of certain courses in the humanities, in economics, and in management.

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Econ. 25	3	Ind. Engin. 82, Work Simplification	2
Mech. Eng. 65, Heat Engin.	3	Mech. Eng. 66, Heat Eng.	3
Civ. Eng. 53, Strength of Mat'ls.	3	Civ. E. 52, Dynamics	3
Elec. Eng. 61, Prin. of Elec. Eng.	4	Elec. Eng. 62, Prin. of E. E.	4
Acct. 25, Prin. of Bus.	3	Acct. 26, Prin. of Bus.	3
Ind. Engin. 51, Ind. Mgt.	3	Mech. Eng. 68, Kinematics	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Civ. Eng. 75, Fluid Mech.	3	Psych. 26, or Soc. 25	3
Mech. Engin. 79, Lab. I	1	Statistics 79, Elem.	3
Mech. Engin. 83, Mach. Design	3	Ind. Engin. 78, Factory Pl.	2
Ind. Engin. 75, Job Evaluation	2	Ind. Engin. 80, Budget Con.	3
Ind. Engin. 76, Time Study	3	Ind. Engin. 54, Eng. Econ.	3
Ind. Engin. 77, Prod. Control	3	Ind. Engin. 92, Sem.	1
Non-Technical Elective	3	Non-Technical Elective	3

Agricultural Engineering

For a description of the major program and the professional opportunities in this field see under College of Agriculture, page 80.

SCHOOL OF HOME ECONOMICS

HELEN S. MITCHELL, *Dean*

The four-year integrated program in home economics prepares young women for challenging professional careers as dietitians in hospitals, clinics, hotels, in other institutions and as community nutritionists. Various opportunities are open in extension service, in family welfare organizations, in business and industry, where manufacturers and public utilities require the services of qualified home economists. Fashion, textiles, merchandising and retailing, journalism, advertising and television frequently turn to the home economist for their personnel. Home economics education prepares teachers for preschool, secondary and adult teaching programs.

In addition to preparation for a career in one of these professions, the graduate home economist has developed an appreciation of the knowledge, understandings, attitudes and skills essential to the complex role of modern women in homemaking and community life, in the dual role of marriage combined with a career now or in later years.

The first year is built around a program of general studies prescribed for all University students.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, Composition	2	English 2, Composition	2
*Speech 3	2	*Speech 3	2
Chemistry 1, General	3	Chemistry 2, General	3
Foreign Language	3	Foreign Language	3
Home Ec. 3, Nutrition	3	Home Ec. 4, Textiles	3
Physical Education 7	2	Math. 12	3
[1]Elective	3	Physical Education 8	2

[1] Elective to be chosen from the following:
Zoology 1, required for majors in Foods and Nutrition and Pre-Research; Botany 1; History 5; Mathematics 7.

* May be taken either semester.

SOPHOMORE-JUNIOR-SENIOR CURRICULA

A student may specialize in one of several fields of home economics, choosing, in consultation with her faculty adviser, courses directly related to her objective. For a B.S. degree in Home Economics, a student must have at least 15 credits in the chosen area during the junior-senior years but not more than 30 credits in one

area of subject matter and never more than 42 in the School. The sophomore year is largely general education and opportunity for electives outside the professional field are encouraged during the last two years. The following core courses or their equivalent are required of all majors: Home Economics 3, 4, 25 or 31, 75, 77, and 90; and a choice of the two Foods courses 30 and 51, or the special course 56 for certain majors.

Child Development and Family Life Education

Students interested in child development, nursery school work and social service work may choose this curriculum. The University has arranged for two affiliations for qualified students interested in taking one semester of specialized work elsewhere: with Merrill-Palmer School in Detroit, which specializes in education for home and family life, and with the Eliot Pearson School in Boston which gives professional training for teaching in nursery schools and kindergartens.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Economics 25, Elements	3	Psychology 26, General	3
Chemistry 33, Organic, or	4	Zoology 35, Vert. Physiology	3
Botany 1, Introductory	3	Sociology 25, Introduction	3
Home Ec. 31, Applied Art	3	Elective	3
Elective	3	Physical Ed. 28	2
Physical Ed. 27	2		

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Home Ec. 70, Child Developm't	3	Home Ec. 56, Meal Planning	3
Home Ec. 75, Ec. of Household	3	Home Ec. 80, Family Life	3
Home Ec. 63, Arts and Crafts	3	Psych. 56, Educational	3
Electives	6		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Home Ec. 77, Household Mgt.	3	Affiliation with either Merrill-Palmer School, Detroit, or the Eliot Pearson School, Boston, or Electives	15
Home Ec. 85, Nursery Sch. Mgt.	3		
Home Ec. 90, Seminar	1		
Home Ec. 95, Child Nutr.	3		
Electives	6		

Foods and Nutrition and Institutional Administration

This curriculum prepares for such professions as therapeutic and administrative dietitian, or nutritionist, and meets the requirements of internships approved by the American Dietetic Association. This

basic curriculum is also advised for those interested in home service, food testing, commercial food demonstrating; commercial, industrial and institutional food service.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Economics 25, Elements	3	Psychology 26, General	3
Chemistry 33, Organic	4	Bacteriology 31, Intro.	4
Home Ec. 31, Appld. Art, or		Home Ec. 30, Food Sci. & Prep.	3
Home Ec. 25, Cons. Cloth. Prob.	3	Accounting 25, Introduction	3
Zoology 35, Vert. Physiol.	3	Physical Ed. 28	2
Physical Ed. 27	2		

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Home Ec. 51, Meal Plan.	3	*Home Ec. 52, Nutri. & Diet.	3
Home Ec. 75, Ec. of Household	3	Home Ec. 77, Home Mgt.	3
Home Ec. 81, Meth. of Teach.	3	Home Ec. 93, Experimental Fds.	3
*Chemistry 79, Biochem.	4	♯Marketing 54, Salesmanship	3
♯Marketing 53, Markt. Princ.	3	Electives	3-6
Electives	3-6		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
♯Home Ec. 61, Demonst. Tech.	2	*Home Ec. 80, Family Life or	
♯Home Ec. 71, Retail Fd. Buy.	3	Sociology 25, Intro.	3
*Home Ec. 89, Diet Therapy	3	Home Ec. 90, Sem.	1
Home Ec. 91, Institution Adm.	3	Home Ec. 92, Inst. Adm.	3
Electives	3-9	Electives	9-12

♯ Recommended for business and institutional majors.

* Elective for students not qualifying for A.D.A.

Pre-Research in Nutrition

This curriculum is planned for the students who wish to prepare for graduate work in nutrition or biochemical research. The course should be planned with the advice of the Dean of the School.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Economics 25, Elements	3	Psychology 26, General	3
Chemistry 29, Qual. Analy.	4	Chemistry 30, Quant. Analy.	4
Zoology 35, Vert. Physiology	3	Bacteriology 31, Intro.	4
Elective	3	Home Ec. 30, Foods	3
Physical Ed. 27	2	Physical Ed. 28	2

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Chemistry 51, Organic	4	Chemistry 52, Organic	4
Home Ec. 51, Meal Planning	3	Home Ec. 93, Experimental Fds.	3
Home Ec. 75, Ec. of Household	3	Electives	9
Electives	6		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Chemistry 79, Biochemistry	4	Home Ec. 52, Nutrition	3
Home Ec. 95, Child Nutrition	3	Home Ec. 90, Sem.	1
Electives	9	Home Ec. 98, Special Problems	3
		Electives	9

Home Economics Education and Extension

Preparation for teaching demands the same basic courses whether a student plans to teach adults or 4-H Club groups in Extension, or young people at the high school or junior high school level. Teachers should be ready to teach some subject other than home economics if demanded; extension workers need special work in rural sociology and adult education. Courses in speech and writing are important. Camp teaching or apprentice training is recommended between junior and senior year.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Economics 25, Elements	3	Psychology 26, General	3
Chemistry 33, Organic	4	Zoology 35, Vert. Physiology	3
Home Ec. 31, Applied Art	3	Home Ec. 30, Foods	3
Home Ec. 25, Consumer Cloth. Prob.	3	Home Ec. 35, Adv. Cloth. Constr.	3
Physical Ed. 27	2	Physical Ed. 28	2

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Home Ec. 51, Meal Planning	3	Home Ec. 60, Equipment	3
Home Ec. 75, Ec. of Household	3	Home Ec. 77, Home Mgt.	3
Home Ec. 81, Methods	3	Home Ec. 80, Family Life	3
Education 51, History of Ed.	3	Home Ec. 90, Sem.	1
Elective	3	Psych. 56, Educational	3
		Elective	3

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Home Ec. 61, Demonst. Tech.	2	Home Ec. 62, Home Furnish.	3
Home Ec. 70, Child Development	3	Home Ec. 90, Seminar	1
Home Ec. 87, Tailoring	3	*Ed. 85, Prac. Teach.	6
Home Ec. 95, Child Nutri.	3	*Ed. 52, Prin. & Meth.	3
Electives	6		

* Students preparing for Extension Service will be advised regarding substitute courses in line with their interests.

Merchandising

This curriculum provides an opportunity for girls interested in preparing for the merchandising field. The junior and senior curriculum includes courses in home economics and in business administration and should be planned with the faculty adviser by the end of the freshman year if possible. Students choosing this program should plan on at least a year of in-service training after college. If the interest is primarily in business, see the Merchandising major under the School of Business Administration.

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Botany 1, Intro. or	3	Psychology 26, General	3
Chemistry 33, Organic	4	Home Ec. 56, Meal Plan. & Fd. Prep.	3
Economics 25, Elements	3	Home Ec. 35, Adv. Cloth. Constr.	3
Home Ec. 25, Con. Cloth. Prob.	3	Accounting 25, Introduction	3
Elective	3	Physical Ed. 28	2
Physical Ed. 27	2		

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Home Ec. 31, Applied Art	3	Home Ec. 62, Home Furnishings	3
Home Ec. 75, Ec. of Household	3	Mktg. 54, Salesmanship & Mgt.	3
Home Ec. 87, Prin. of Tailoring	3	Home Ec. Elective	3
Mktg. 53, Mktg. Prin.	3	Electives	6
Elective	3		

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Home Ec. 77, Home Mgt.	3	Mktg. 62, Mktg. Research	3
Mktg. 71, Retail Merchandising	3	Home Ec. 90, Seminar	1
Mktg. 73, Advertising	3	Electives	12
Home Ec. Elective	3		
Electives	6		

SCHOOL OF NURSING

MARY A. MAHER, *Dean*

The basic professional nursing program is designed to prepare qualified high school graduates for a career in professional nursing, for marriage and family living. It aims to equip the student with those understandings, attitudes, skills and appreciations which are essential for a competent practitioner and health teacher.

The program is planned specifically to help the student increase her self-understanding so that she may function constructively and creatively in her personal and professional relationships; enhance and improve her emotional, physical, social and spiritual well-being; extend her understanding of the health needs of the individual and family and of the community organizations primarily concerned with the promotion of health and prevention of illness; improve her professional competency as she ministers to the individual and the family in selected clinical situations; more fully understand and appreciate her role in the nursing, the therapeutic and the health team; become sensitive to the need and responsibility for periodic appraisal and improvement of professional nursing practice; become a more self-directive and responsible member of the profession and of the community; and improve her professional competency through continued study.

The graduate of such a program is ready for a beginning position in a variety of nursing situations, including public health; for leadership in the hospital nursing team; and for participation with allied personnel in providing comprehensive patient care. A foundation is laid for advanced study, through which the nurse may prepare for positions in teaching, supervision, administration, consultation and research.

During the first two academic years at the University, the student builds an educational foundation upon which to base the more specialized portion of the program. Courses in the humanities and in the sciences—biological, physical and behavioral—are taken with other students on the campus.

The clinical aspects of the program are developed in the next two and one half years, when instruction and correlated clinical practice is given in selected cooperating agencies by the nursing faculty of the University and allied professional staffs of the cooperating agencies. These agencies include: the Springfield Hospital; the Wesson Maternity Hospital, Springfield; the Visiting Nurse Association of Springfield; the Springfield Health Department; the

New England Medical Center, Boston; and the McLean Hospital, Waverly.

The student returns to the campus for a fifth academic semester, upon completion of which a Bachelor of Science degree is awarded. This qualifies the graduate for State Board Examinations in Nursing. If achievement in these examinations is satisfactory, the candidate receives legal status as a registered nurse within the state.

PROGRAM SEQUENCE

FIRST YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 1, English Comp.	2	English 2, English Comp.	2
Chemistry 1, General	3	Speech 3	2
History 5, Mod. Europ. Civil.	3	Chemistry 2, General	3
Zoology 1, Introductory	3	History 6, Mod. Europ. Civil.	3
Nursing 1, Intro. to Nurs.	1	Mathematics 12, Functional	3
Sociology 25, Intro. to Soc.	3	Nursing 2, Fund. of Nurs. I	1
Physical Ed. 7	2	Psychology 26, General	3
		Physical Ed. 8	2

SECOND YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25, Humane Letters	3	English 26, Humane Letters	3
Chemistry 33, Organic	4	Bacteriology 31, Intro.	4
Sociology 53, Intro. Anthropol.	3	Home Ec. 70, Child Development	3
Home Ec. 41, Nutri. & Fd. Prep.	3	Nursing 26, Fund. of Nurs. Care	4
Nursing 25, Fund. of Nurs. II	1	Zoology 38, Human Anat. & Physiol.	3
Zoology 37, Human Anat. & Physio.	3	Physical Ed. 28	2
Physical Ed. 27	2		

THIRD AND FOURTH YEARS

	1st Semester	*Credits*
Nursing 51	Medical and Surgical Nursing I	16
Nursing 60	Medical and Surgical Nursing II	16
Nursing 52A, 57, 52B	Maternal and Child Health Nursing	
	Unit I—Nursing 52A—Nursing of Children I	4
	Unit II—Nursing 57—Maternity Nursing	10
	Unit III—Nursing 52B—Nursing of Children II	10
Nursing 56	Tuberculosis Nursing	3
Nursing 54	Psychiatric Nursing	10
Nursing 58	Public Health Nursing	6

FIFTH YEAR

Nursing 65	Advanced Nursing	8
Nursing 66	Senior Nursing Seminar	4
Nursing 67	Social and Historical Foundations of Nursing	2
	Liberal Arts Electives	10

DEPARTMENTS OF MILITARY SCIENCE AND AIR SCIENCE RESERVE OFFICERS TRAINING CORPS

Colonel James R. Weaver, *U. S. Army, Head*

Colonel Donald B. White, *U. S. Air Force, Head*

An Act of Congress, July 2, 1862, required the Commonwealth of Massachusetts to provide a two-year course in military instruction at the Massachusetts Agricultural College when it was established. All able-bodied male students who were enrolled for four years were required to take this training. This requirement has continued until today, although The National Defense Act of 1916, as amended in later years, created a Reserve Officers' Training Corps at those colleges which were giving military instruction.

The National Security Act of 1947, which created the United States Air Force as a separate armed service, also resulted in separate Army and Air Force Reserve Officers' Training Corps units being organized at the University of Massachusetts and other colleges and universities.

All physically qualified male candidates for a degree in any four-year course at the University, except Veterans, are required to take the basic course (Army or Air) during freshman and sophomore years.

The choice of service, Army or Air Force, must be made by each student when he initially enrolls. The student in the basic course is provided with a uniform of the service in which he is enrolled. A deposit of $30 is required to cover the cost of loss or damage to any of the articles issued.

Military Science

The purpose of the Army Reserve Officers Training Corps Program is to train those college students who possess the necessary aptitude and attributes for positions of leadership in the Armed Forces of the United States, in the event of a national emergency.

In addition to the required two year course in military instruction, the Army Reserve Officers Training Corps Program offers an advanced course. This course, which stresses training in leadership, is elective and is available to all fully qualified male students. Each student who is accepted for this advanced training by the

University and the Professor of Military Science and Tactics will receive the following benefits:

(1) The Government will give him a substantial uniform allowance and pay him approximately $30 per month while in attendance at the University during his junior and senior years.

(2) Upon successful completion of the Advanced Course the student will be commissioned a second lieutenant in the Army of the United States.

(3) Outstanding Advanced Course students will be offered commissions as second lieutenants in the Regular Army.

Air Science

Primarily the AFROTC program is intended to provide the Air Force with officers who are ready for active duty, but it is also of benefit to cadets who will remain civilians. The purpose of the instruction is to increase the student's ability to understand and evaluate national and world affairs in the Air Age by giving him a new perspective on international developments, on the place of civilian and military aviation in the U. S. economy, and the importance of air power in the defense of the Nation.

The first two years of instruction, Basic AFROTC, give a foundation for leadership and Air Age citizenship. The program of the second two years, Advanced AFROTC (and four weeks of summer training at the end of the junior year) is designed primarily to provide officers training for those selected and qualified for flight training or are technically qualified and are under Air Force contract. A category system for selection of Advanced AFROTC students is as follows:

I. A cadet medically qualified as Class I by an Air Force Flight Surgeon and has an acceptable pilot aptitude stanine rating (AFOQT).

IA. A cadet medically qualified as Class I or IA by an Air Force Flight Surgeon and has an acceptable observer aptitude stanine.

II. A cadet medically qualified by an Air Force Flight Surgeon to receive a reserve commission. The cadet must be enrolled as a scientific, technical, or engineering major.

III. A cadet medically qualified by an Air Force Flight Surgeon to receive a reserve commission and not medically or aptitudinally qualified to pursue flight training.

IV. A cadet medically qualified by an Air Force Flight Surgeon to receive a reserve commission. He may have any type of academic major but must have had sufficient prior military service to qualify as a veteran.

DIVISION OF PHYSICAL EDUCATION

W. P. McGuirk, *Head*

The Division of Physical Education includes the Departments of Physical Education for Men, Physical Education for Women, Recreational Leadership, and Athletics. It offers a major in Physical Education for Men, and in Recreational Leadership for men and women.

GENERAL PROGRAM

Each male freshman and sophomore student is required to successfully complete four semesters of physical education and demonstrate his ability to swim as a requirement for his degree, unless exempted under the following conditions. The physical education requirement does not apply to those students excused by the University physician; veterans of military service; and certain transfer students.

Students may receive credit for physical education, during the sport in season, by becoming a squad member of any freshman or varsity team. Freshmen students who elect an athletic team sport for physical education credit must rejoin their class section at the termination of the seasonal sport. Students may not participate in a given sport for credit for more than two semesters.

In fulfilling the requirements all students must have participated in three team sports, four individual activities and aquatics.

MAJOR PROGRAMS

Physical Education for Men

S. W. Kauffman, *Adviser*

The major program leading to the degree of Bachelor of Science in physical education is designed to train the student for a career as a teacher of physical education. The curriculum combines both general and professional education and provides for full teacher certification for the student who has met the prescribed requirements of preparation. The program also provides for adequate training in a minor area of teaching, elected by the student, including the coaching of inter-school athletics.

FRESHMAN YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Engish 1	2	English 2	2
*Speech 3	2	*Speech 3	2
P. E. 23, Principles of Health Ed.	3	Govt. 25 or History 6	3
Econ. 25 or Soc. 25	3	Mathematics 12 or 14	3
P. E. 21, Intro. to Phys. Ed.	3	P. E. 22, First Aid and Safety	3
Military 1	1	Military 2	1
P. E. 5, Skills and Techniques	1	P. E. 6, Skills and Techniques	1

* May be taken either semester.

PHYSICAL EDUCATION

Elect One		*Elect One*	
Chemistry 1	3	Chemistry 2	3
Botany 1	3	Botany 1	3
Zoology 1	3	Zoology 1	3

SOPHOMORE YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
English 25	3	English 26	3
Zoology 35, Physiology	3	Bacteriology 31	4
P. E. 41, Anatomy	3	P. E. 42, Kinesiology	3
Psych. 26, General	3	Psych. 56, Educ. Psychology	3
P. E. 35, Skills and Techniques	1	P. E. 36, Skills and Techniques	1
Military 25	1	Military 26	1
Electives	3	Electives	3

JUNIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Rec. Lead. 77, Org. & Adm. Comm. Rec.	3	Psych. 94, Child Psych.	3
P. E. 53, P. E. in Elem. Schl.	3	Speech 91, Extempore Speech	3
P. E. 57, Meth. & Mat. Coaching (baseball-gymnastics)	2	P. E. 54, Phys. Ed. Sec. Sch.	3
P. E. 59, Adaptive Phys. El.	3	P. E. 58, Meth. & Mat. Coaching (track-football)	2
P. E. 63, Skills and Techniques	1	P. E. 64, Skills and Tech.	1
Electives	3-6	Electives	3-6

SENIOR YEAR

1st Semester	*Credits*	*2nd Semester*	*Credits*
Ed. 52, Prin. and Meth. Teach.	3	P. E. 76, Philos. and Prin. Phys. Ed.	3
Ed. 88, Sec. Sch. Curriculum	3	P. E. 74, Tests and Msmts. in Phys. Ed.	3
*Ed. 85, Practice Teaching	6	P. E. 78, Physiology of Exercise	3
P. E. 55, Org. & Adm. of P. E.	3	P. E. 82, Meth. and Mat. of Coaching (soccer-basketball)	2
P. E. 83, Skills and Techniques	1	P. E. 84, Skills and Tech.	1
		Electives	3-6

Recreation Leadership

W. E. RANDALL, *Adviser*

The department seeks to prepare students for positions involving administrative, supervisory, and program leadership responsibilities in municipal recreation agencies, voluntary and youth-serving agencies, hospitals, and industrial and institutional organizations. Students who plan a career in recreation should register as early as possible with the department.

The program is designed to provide opportunities for a broad liberal education, a knowledge and understanding of people and society, activity skills and resource knowledge, professional competency, and practical experience in various leadership situations.

Major students are required to take the following courses: Recreation Leadership 51, 52, 74, 77, 79, 80; Education 66; Psychology 62, and 93 or 94; Sociology 51, and one of the following: Sociology 52, 53, 56, 57, 68, 75. Two summers of leadership experience are required, without course credit: one summer should be in an organized camp and the other on a playground or in an institutional program. Each major student should have a working knowledge and some skill in each of the following: arts and crafts, music, dramatics, nature, sports, social recreation, public speaking, and first aid and safety.

Sophomores should elect Psychology 26, Sociology 25, and Government 25. Economics 25 and Philosophy 25 are recommended.

Physical Education for Women

RUTH J. TOTMAN, *Adviser*

The courses in physical education for women are planned to provide recreative activity, to develop body grace and efficiency, and to increase health and vigor. A major will be available on completion of new building.

The first and second year women students are required to take physical education three times a week and are given two credits for each semester of satisfactory work. Third and fourth year students may elect Physical Education 63, 64, 65, 66, 68. Sophomores may take these courses by special permission.

DEPARTMENT OF ATHLETICS

W. P. MCGUIRK, *Director;* E. E. LORDEN, *Assistant Director* and Head Coach of Baseball and Assistant Coach of Football

The following men will be coaching intercollegiate athletics and intramurals:

C. C. O'Rourke, head coach of football; C. C. Gladchuck, assistant coach of football and coach of freshman basketball and varsity golf; N. Reebenacker, freshman coach of football and supervisor of intramurals; R. T. Curran, head coach of basketball and coach of freshman baseball; W. Footrick, coach of track and cross country; J. Cobb, assistant track coach; L. E. Briggs, coach of soccer and skiing; S. R. Kosakowski, coach of hockey and tennis and supervisor of Stockbridge School athletics; B. Ricci, Jr., freshman lacrosse coach; J. Douglas, coach of wrestling and assistant freshman football coach; R. F. Garber, coach of lacrosse; J. R. Rogers, Jr., coach of swimming and coach of pistol; J. S. Bosco, coach of gymnastics; E. Shea, business manager and director of sports relations.

RELIGION

Chaplains Power, Ruchames, and Seely, *Advisers*

The courses in the history of religion, the articles of belief and the application of religious principles are given by the Chaplains of the three major western faiths and by others designated by the churches represented. They are financially independent of the University although the facilities of the University are available as for other courses.

Courses are offered in this field for the sake of the student who is interested in rounding out his educational program with the acquiring of a mature perspective in religion. The opportunity is offered for the student to gain a wide knowledge of the forces which have been basic to his culture, an understanding of the religious influences in his own life, and an evaluation of the part that religion plays in current social movements.

Students register for these courses at the regular registration period and may do so in addition to a normal semester load. No academic credit accrues from participation in the courses in religion.

DIRECTORY OF COURSES

This section contains a list of courses offered in the regular sessions of the University. Course descriptions are arranged alphabetically according to subject matter fields. If any course cannot be found readily, refer to the General Index in the back of the catalogue. A separate bulletin will outline those available during the summer. The University reserves the right to withdraw any course for which an insufficient number of students enroll.

Courses are designated by numbers as follows: freshman 1-24 inclusive; sophomore 25-49 inclusive; junior 50-74 inclusive; senior 75-99 inclusive. Odd numbers designate courses given in the first semester, even numbers those offered during the second. Credit is indicated in terms of semester hours. Where possible, the class schedule follows the course description. A complete schedule of class hours is published at the beginning of each semester.

Students are referred to the section on Divisions of Study and Curricula for a statement of graduation requirements and majors available.

AGRICULTURAL ECONOMICS AND FARM MANAGEMENT

Professor Lindsey, Professor Crossmon, Associate Professor Russell, Assistant Professor Callahan, Assistant Professor Foster, Mr. Lee.

26. (II) Economics of Agricultural Production

This course considers the principles of production economics. An analysis of specialization, comparative advantage, diminishing, constant, and increasing costs and returns applied to the individual establishment as well as to the nation. A careful study of the combination of the factors of production is made considering the individual's adjustment when operating under monopolistic competition, laissez-faire, and monopoly. Finally, dynamic and static factors are considered in relation to their effects on the individual's production, on the economy of cities and nations, and on the international economy.

3 class hours. Credit, 3.
8:00-8:50 M. W. F. Mr. Foster.

55. (I) Marketing Farm Products

Not open to students who have taken or are taking Marketing 53. An analysis of present and past systems of assembling, transporting, distributing, and grading agricultural products. Such aspects as the adjustment of production and consumption, price formation, channels of distribution, price differentials and margins, public policy, market reporting and forecasting, and a study of the marketing of major agricultural products are considered. Geographic,

future, and quality differentials are studied from the agricultural and commercial standpoint. A field trip may be arranged.

3 class hours. Credit, 3.

8:00-8:50 M. W. F. Mr. Lindsey.

56. (II) The Fundamentals of Cooperation

A study of the philosophy and principles of cooperation in Europe and in the United States. The history of cooperation, legal consideration, management, financing, membership relations, methods of formation, sales methods and policies are given full attention. Progress in the cooperative marketing of different agricultural products is studied.

3 class hours. Credit, 3.

8:00-8:50 M. W. F. Mr. Lindsey.

57. (I) Agricultural Credit and Land Appraisal (1958-59)

A study of the development, use, functions, and operations of public and private credit institutions which are available to agriculture. Special emphasis is given to the practical aspects of credit policy and land appraisal. Given in alternate years.

3 class hours. Credit, 3.

11:00-11:50 M. W. F. Mr. Lindsey.

71. (I) Agricultural Economic Theory (1959-60)

The course is a comparative and critical study of the significant contributions of the leading economists to the theory of agricultural economics from the time of Adam Smith to the present. Given in alternate years.

3 class hours. Credit, 3.

11:00-11:50 M. W. F. Mr. Foster.

75. (I) Farm Organization and Management

This course analyzes the functions of the farmer as a business proprietor. Both the external and internal economic forces affecting the farm business are considered, such as selection and combination of factors of farm production, choice and combination of farm enterprises, the economical use of funds, the nature of farming costs, adjusting farm production to markets and prices, and the management of equipment and labor.

3 class hours. Credit, 3.

9:00-9:50 M. W. F. Mr. Crossmon, Mr. Foster.

Prerequisite, Agricultural Economics 26.

76. (II) Advanced Farm Organization and Management

The use of farm records and accounts as a basis for planning and budgeting is emphasized. Measures of success and factors in success in farming, and work simplification as applied to efficient farm techniques are considered. The last part of the course will be given over to the specific study of selected farms and the practical application of the principles and practices already discussed. Field trips are required at an estimated cost of not over five dollars.

1 class hour; 1 4-hour laboratory period. Credit, 2.

10:00-10:50 Th.; 1:00-4:50 M. Mr. Crossmon, Mr. Foster.

Prerequisite, Agricultural Economics 75.

78. (II) Principles and Problems of Land Economics

A study of the major contributions by outstanding economic writers to theoretical land economics; a review of American land policies; a presentation of the principles, techniques, and objectives involved in modern land use planning; and a discussion of contemporary land problems in the United States.

3 class hours. Credit, 3.

11:00-11:50 M. W. F. Mr. Foster.

83. (I) Advanced Farm Operation

For seniors specializing in agriculture; others by permission of instructor. A study of the efficiency of operations on a specific farm.

3 hours or equivalent. Credit, 3.

Hours by arrangement. Mr. Crossmon.

89. (I) 90. (II) Seminar in Agricultural Economics

A study of special problems in agricultural policy, agricultural institutions, market and price analysis.

Hours by arrangement. The Department.

STATISTICS

77. (I) Elementary Experimental Statistics

Primarily for students in psychology, sociology, biology, chemistry, agronomy, poultry, animal husbandry, food technology, education, and public health, who are interested in obtaining and handling data of small samples. Chi square, "t" and analysis of variance tests of significance; frequency distribution, averages, dispersion, regression and simple correlation description; and chart and table presentation are the specific fields covered. Students taking this course may not take Statistics 79.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

Mr. Russell.

79. (I) Elementary Economics Statistics

Primarily for students in economics, business administration, mathematics, and industrial engineering, who are interested in obtaining and presenting the data of large samples. Surveys, tables, charts, frequency distributions, averages, dispersion, standard error and its use, quality control, index numbers, time series, and simple correlation are the specific fields covered. Students taking this course may not take Statistics 77.

3 1-hour periods; 1 2-hour laboratory period. Credit, 3.

Mr. Russell.

80. (II) Advanced Statistics

This course is primarily devoted to linear and curvilinear multiple correlation analysis. Machine and shortcut graphic methods are used. Some time will also be devoted to probability and analysis of variance.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

1:00-1:50 W.; 1:00-2:50 M. F. Mr. Russell.

AGRICULTURE

1. (I) Economic Geography of the World's Agriculture

The agriculture of North America is given first consideration but special emphasis is placed on the study of southeastern Asia and the Soviet Union.

3 class hours. Credit, 3.

Mr. Jeffrey.

AGRICULTURAL ENGINEERING

Professor Kleis, Associate Professor Zahradnik, Associate Professor Clayton, Assistant Professor Tague, Mr. Powers, Mr. Pira, Mr. Boyd.

51. (I) House Planning

Plan designs of the small house will be made. The arrangement of interior equipment, especially in the kitchen, and lighting, heating, water supply, and sewage disposal will be studied, together with a brief history of the house materials, construction methods, equipment, and architectural styles. Consideration will be given to the economics of house building, including financing, and to maintenance and overhead expense.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

Mr. Kleis.

55. (I) Farm Shop

For students in agriculture and horticulture. Laboratory exercises cover instruction and practice in the use of carpenter's tools in construction and in bench work, arc and gas welding, pipe fitting, soldering, use of machinist's tools in machinery repair, and the mixing and placing of concrete. Classroom instruction covers materials of construction and the utilization of local and special materials for these purposes.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

Mr. Powers.

72. (II) Drainage and Irrigation Engineering

This course covers the engineering phase of drainage and reclamation. The various systems are studied, complete layouts established in the field, and problems of flow and run-off given.

1 class hour; 1 2-hour laboratory period. Credit, 2.

Mr. Boyd.

74. (II) Farm Structures

A study of the strength and durability of building materials, of construction systems and of the mechanical principles underlying their use in farm construction. Studies will be made of some major farm building and complete working drawings finished in all essential details.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

Mr. Clayton.

80. (I) and (II) Food Process Engineering

A study of food processing machinery and instrumentation.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Zahradnik.

82. (II) Refrigeration

Fundamentals in planning and operating a refrigerated storage with particular reference to size, details of construction, cooling load, and refrigerating machinery and accessories. For non-engineering majors.

1 class hour; 1 3-hour laboratory period. Credit, 2.
Mr. Zahradnik.

AGRONOMY

Professor Colby, Professor Dickinson, Professor Steckel, Associate Professor Roberts, Assistant Professor Zak, Mr. Southwick, Mr. Troll.

22. (II) Soils

This is an elementary course relating soils and their management to crop growth. This course is designed to give the student a broad background in soil science and its direct application to practical field problems. The course itself is presented with the object of introducing to the student the properties of soils and their influence upon the production of crops. The laboratory work consists of investigation of the fundamental characteristics of soil and basic principles of fertilizer and liming practices.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Zak.

51. (I) Field Crops

A study of the field crops of the United States which include their uses and improvement, with their soil and climatic requirements. Emphasis will be given to the best farm practices of the northeastern states as to rotation, liming, fertilizing, seeding methods, tillage, disease and insect control, and to methods of harvesting and storage. As an individual problem, each student must take a detailed plan of crop production for the actual conditions of some New England farm.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 Tu. Th.; 1:00-2:50 Th. Mr. Southwick.

52. (II) Forage Crops

An analysis of the basic principles involved in the establishment, fertilization, and management of forage grasses and legumes.

3 class hours. Credit, 3.
Mr. Colby.

57. (I) Soil Formation

The first part of this course considers those physical, chemical, biological, climate and geological factors involved in soil formation. The relationship of these factors to the kinds of soil formed in the United States is discussed.

3 class hours. Credit, 3.
Mr. Southwick.

58. (II) Soil Utilization

The relationship of climate and native vegetation to the broader aspects of soil formation is described. Man's use of land resources is connected to show how the agricultural background of settlers has been active in soil use and abuse. Soil erosion control and its significance to permanent agriculture is considered.

3 class hours. Credit, 3.
8:00-8:50 M. W. F. Mr. Southwick.

AGRONOMY

77. (I) Crop Improvement

Theory and practice of the improvement of field crops by breeding and selection.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Hours by arrangement.
Prerequisites, Agronomy 51, Pomology 52, Zoology 53.

78. (II) Fertilizers and Soil Fertility

The primary purpose of this course is to relate soils and fertilizers to plant growth. Studies are made of fertilizer practices in the United States and Europe. In the early part of the course consideration is given to the history of fertilizer development, with special emphasis upon early discoveries and causes of failure in early research. Later in the course, studies are made of factors which relate fertilizers and soils to plant growth. Fertilizer formulation technology and practice are considered in detail in the laboratory phase of this course.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 Tu. Th.; 1:00-2:50 Th. Mr. Zak.

79. (I) Soil Physics

For seniors specializing in agronomy. The factors in soil which control tilth and energy relationships and the laws of physics which govern these factors are discussed. This includes heat, light, color, particle size and charge, water and gas movement, energy relationships and other physical factors effecting changes in the soil. The laboratory is used to familiarize the students with various methods used in measuring these important physical factors.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

81. (I) 82. (II) Special Problems in Agronomy

For seniors specializing in agronomy. This course is designed to acquaint students with agronomic research methods and practical agronomic procedures.

3 2-hour laboratory periods. Credit, 3.
Mr. Colby.

84. (II) Soil Chemistry

For plant science and soil science students. Fundamental inorganic, organic, and bio-chemical reactions of soils are discussed and related to plant nutrition and microbiological activities. Colloidal aspects of soil chemical reactions and soil-plant interrelationships will be studied.

3 class hours. Credit, 3.
Prerequisites, Chemistry 29, Botany 68, Agronomy 57. Mr. Steckel.

84B. (II) Soil Chemistry Laboratory

Primarily for seniors majoring in agronomy. Methods and techniques used in soil chemistry research and in plant science investigations will be studied. The student will be made familiar with methods of determining exchangeable bases, base exchange capacity, soil phosphate fractionation, and many other determinations peculiar to soil investigations. To be taken concurrently with Agronomy 84.

2 3-hour laboratory periods. Credit, 2.
Prerequisites, Chemistry 29, 30, Botany 68, Agronomy 57. Mr. Steckel.

AGROSTOLOGY

53. (I) Agrostology

All factors that influence the successful growing of fine turf grasses are studied and correlated to enable the student to have a practical working knowledge of the construction and maintenance of lawns, sports, highway, airport and cemetery turf.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Roberts.

56. (II) Agrostology

This course considers fine turf management as a business and profession. Emphasis is placed on diagnosis and treatment of turf failures; the selection of equipment and supplies and client approach. Field trips and practical exercises are arranged.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

Mr. Roberts.

ART

Instructors in Landscape Architecture.

27. Modeling

A course in elementary modeling, of seeing, analyzing, and reproducing form in clay and modeling wax to develop sculptural technique.

6 laboratory hours. Credit, 3.

Mr. Kantianis.

28. Modeling

A continuation of Course 27 in advanced design and the making of plaster casts from original problems in small sculpture, such as plaques, masks, and medals or other such pieces.

6 laboratory hours. Credit, 3.

Prerequisite, Art 27. Mr. Kantianis.

31. (I) Elementary Design

For women. Elementary principles of design as applied to textiles, fabrics, interior decorations, etc.

3 2-hour laboratory periods. Credit, 3.

Mr. MacIver.

33. (I) Freehand Drawing

A non-professional course in elementary drawing and painting in various media in black and white. The work is more or less personal and is adapted to the individual capacities and backgrounds of each student as far as possible. Limited to three sections of 20 students each.

6 laboratory hours. Credit, 3.

Mr. MacIver.

34. (II) Freehand Drawing

This non-professional course is essentially one in which the use of color is stressed in various media, freehand drawing is emphasized and paintings in still-life and landscape subjects are produced. Limited to three sections of 20 students each.

6 laboratory hours. Credit, 3.

Mr. MacIver.

75. (I) Art Appreciation

An analysis of the principles of critical judgment underlying the fine arts, leading toward the enjoyment of art and its application to everyday life.

3 class hours. Credit, 3.
9:00-9:50 M. W. F. Mr. Otto.

78. (II) Early and Medieval Art

An appreciative survey of art and history from early times to the present. Works in painting, sculpture, architecture, and the minor arts are examined in the light of their contributions to the history of civilization, and to the development of art forms.

3 class hours. Credit, 3.
11:00-11:50 M. W. F. Mr. Hamilton.

BACTERIOLOGY AND PUBLIC HEALTH

Professor France, Associate Professor Garvey, Associate Professor Perriello, Assistant Professor Czarnecki, Assistant Professor Mandel, Assistant Professor Larkin, Mr. Wisnieski, Mr. Ernest A. Snow of the Division of Sanitary Engineering of the Massachusetts Department of Public Health.

31. (I) and (II) Introductory Bacteriology

Students majoring in Liberal Arts, Business Administration, and Agriculture taking this course to satisfy a science requirement should take it first semester. Designed to present to students interested in general science, agriculture, horticulture, and home economics the fundamental concepts of bacteriological science; make microorganisms real and significant; and demonstate their importance in the problems of agriculture, general science, industry, public health, and medicine. The laboratory work covers the use and care of the compound microscope, the preparation of culture media, methods of sterilizing equipment, the isolation and aseptic handling of pure cultures, simple and differential staining, bacterial classification and differential studies on type species of pathogenic and non-pathogenic bacteria.

2 class hours; 2 2-hour laboratory periods. Credit, 4.
12:00-12:50 M. F. or Tu. Th.; 1:00-2:50 or 3:00-4:50 M. F. or Tu. Th.
Mr. Czarnecki, Mr. Larkin.

51. (I) 52. (II) Advanced Bacteriology

A continuation of introductory bacteriology. Studies on bacterial metabolism and the influence of environment factors on growth and viability. The identification and differentiation of bacterial species by morphological, cultural, physiological, and serological studies; disinfectants and antibiotics. The combined courses give to the student not ony a comprehensive picture of various forms of existing bacteria but develop a specialized technique for their cultivation, isolation, and identification.

2 class hours; 2 2-hour laboratory periods. Credit, 3.
For 51, 12:00-12:50 Tu. Th.; 1:00-2:50 or 3:00-4:50 Tu. Th.
For 52, 1:00-1:50 Tu. Th.; 2:00-3:50 Tu. Th. Miss Garvey.
Prerequisite, for 51, Bacteriology 31; for 52, Bacteriology 51.

54. (I) and (II) Water and Sewage Bacteriology

For students majoring in Engineering. Elementary bacteriology with emphasis placed upon the importance of bacteria found in water and sewage.

Work will include routine analysis used in the examination of water and sewage and in the laboratory control of water and sewage treatment plants.

2 3-hour laboratory periods. Credit, 3.
2:00-4:50 Tu. Th. Mr. Perriello.
Prerequisite, Civil Engineering 77 or permission of the instructor.

55. (I) Fundamentals of Soil Microbiology

This course is designed for students majoring in agricultural and related fields. Subjects included will be: fundamental laboratory procedures and techniques; quantitative and qualitative microbiological analysis of various types of soils; studies on the carbon and nitrogen cycles as affected by soil microorganisms.

2 3-hour laboratory periods. Credit, 3.
Mr. Mandel.

56. (I) and (II) Methods for Bacteriological Preparations

This course is intended for students majoring in bacteriology and public health. The material given in the course includes methods of preparation and sterilization of culture media and equipment, the preparation of stains and reagents, and the use, care and repair of laboratory instruments.

2 2-hour laboratory periods. Credit, 2.
Mr. Mandel, Mr. Larkin.

81. (I) General Applied Bacteriology

This course is designed to give the student a working knowledge of routine and special tests used in present day applied bacteriology. Subjects receiving consideration are: methods for determining the sanitary quality of milk and milk products, water and shellfish; eating and drinking utensils; and air.

2 class hours; 2 2-hour laboratory periods. Credit, 3.
12:00-12:50 M. F.; 1:00-2:50 or 3:00-4:50 M. F.
Mr. France, Mr. Perriello.
Prerequisite, Bacteriology 51 or permission of the instructor.

82. (II) Quantitative and Qualitative Bacteriology

Consideration will be given to (1) bacteriological principles which apply to the preservation, fermentation and spoilage of foods, (2) the sanitary examination of foods, (3) the causes of food poisoning, and (4) microbiological assays.

2 class hours; 2 2-hour laboratory periods. Credit, 3.
1:00-1:50 M. F.; 2:00-3:50 M. F. Miss Garvey.
Prerequisite, Bacteriology 51 or permission of the instructor.

85. (I) Bacteriology (Immunology)

Admission by permission of the instructor. This course includes consideration of host reactions which favor the prevention and cure of disease; qualitative and quantitative estimations of toxins and antitoxins; the use of biological products such as antigens and immune sera in differential bacteriology and in disease diagnosis; and a consideration of isohemagglutinins as determinants of blood groups.

1 class hour; 1 4-hour laboratory period. Credit, 3.
12:00-12:50 W.; 1:00-4:50 W. Miss Garvey.

BACTERIOLOGY AND PUBLIC HEALTH

90. (II) Sanitary Bacteriology

A detailed study of public health laboratory methods. Practical application of methods will be made through field studies.

1 4-hour and 1 2-hour laboratory period. Credit, 3.
1:00-4:50 M.; 1:00-2:50 F. Mr. France, Mr. Perriello.
Prerequisite, Bacteriology 81.

92. (II) Clinical Microbiology

This course is designed for students majoring in medical technology. The purpose of the course is to familiarize the student with routine clinical laboratory procedures.

1 class hour; 1 3-hour laboratory and 1 2-hour laboratory period. Credit, 3.
1:00-1:50 Tu.; 2:00-4:50 Tu.; 1:00-2:50 Th. Mr. France.
Prerequisites, Bacteriology 85; Zoology 35, 69.

93. (I) 94. (II) Problems

Qualified seniors who have obtained permission from the department may arrange for independent work on special problems in bacteriology.

Credit, 3.
The Department.

95. (I) Studies of Special Microbial Groups

A study of the biology of certain groups of microorganisms considered only briefly or not at all in other courses offered in the department. The course will cover the autotrophic bacteria, photosynthetic bacteria, actinomycetes, myxobacteria, chlamydobacteria and spirochaetes.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisite, Bacteriology 51. Mr. Mandel.

98. (II) Bacterial Physiology

The growth and activities of microorganisms as influenced by the environment and genotype and their effect on the environment. Topics considered include the kinetics of population growth, enzymatic constitution, growth requirements, metabolic pathways, and effects of radiation.

2 class hours; 1 4-hour laboratory period. Credit, 3.
Mr. Mandel.
Prerequisites, Bacteriology 31; Chemistry 79 or equivalent, and permission of the instructor.

PUBLIC HEALTH

61. (I) 62. (II) General and Community Sanitation

A study of the problems of general and community sanitation. Subjects discussed will include insect and rodent control, housing and slum clearance, ventilation, lighting, bathing places, sanitation of eating utensils, nuisances, camp sanitation, industrial hygiene, water supplies, sewerage and sewage, refuse and garbage, food and milk sanitation.

3 class hours. Credit, 3.
10:00-10:50 M. W. F. Mr. Perriello, Mr. Wisnieski.

63. (I) Industrial Hygiene and Sanitation

A comprehensive study of the practices and principles of industrial processes which may constitute problems in sanitation; industrial wastes, smoke abate-

ment, and the health of the worker. Subject matter includes organization of programs and the formation of policies for the inspection of sanitary and mechanical facilities of factories, food processing plants and other industries.

3 class hours. Credit, 3.

8:00-8:50 M. W. F. Mr. Perriello.

64. (II) Microscopy of Water

A study of microscopic forms of life exclusive of the bacteria. Counting and control of plankton in potable waters. Elements of limnology.

2 class hours; 1 2-hour laboratory period. Credit, 3.

9:00-9:50 M. F.; 8:00-9:50 or 10:00-11:50 W. Mr. Snow.

Prerequisite, Bacteriology 31.

66. (I) and (II) Principles of Sanitation

The application of sanitary engineering and related sanitary sciences to health problems in the environment of urban and rural communities.

2 class hours. Credit, 2.

10:00-10:50 Tu. Th. Mr. Perriello.

Prerequisite, Civil Engineering 77 or permission of the instructor.

84. (II) Public Health Administration

Admission by approval of the instructor. The organization, function, and administration of governmental health agencies; the relationship of official and volunteer health agencies; preparation and presentation of lectures, demonstrations, and exhibits. Public health laws, regulations, and sanitary codes, their origin and enforcement.

3 class hours. Credit, 3.

11:00-11:50 M. W. F. Mr. Perriello.

86. (II) Field Studies in Sanitation

Trips will be taken into the field for the observation of public health practices in sewerage; sewage treatment and disposal; the production and purification of public water supplies; housing and slum clearance; insect and rodent nuisances; milk production, handling, and distribution; garbage and refuse collection and disposal; slaughter houses and rendering plants; cold storage warehouses; and bakery and restaurant sanitation. A comparative study of urban and rural services will be made. Although transportation will be furnished, students are expected to finance their own meals.

1 class hour; 1 4-hour laboratory period. Credit, 2.

Hours by arrangement. Mr. Wisnieski.

Prerequisites, Public Health 61 and 62.

88. (II) Epidemiology and Communicable Disease Control

Admission by approval of the instructor. Consideration of the factors involved in the spread of infections; a detailed discussion of the communicable diseases, their distribution, cause, epidemiology, and means of prevention and control. The use of vaccines, serums and drugs for prevention and treatment. Mass immunization programs.

3 class hours. Credit, 3.

8:00-8:50 M. W. F.

92. (Summer) Supervised Field Training

All students majoring in sanitary technology must complete a prescribed thirteen-week field training program conducted by the New England Field Training Center under the direction of the Training Division of the Communicable Disease Center, U. S. Public Health Service, with the assistance of the staff and State Department of Health personnel. This course is a prerequisite for placement in federal, state and municipal agencies

13 weeks. Credit, 6.

The Staff.

BOTANY

Professor Kozlowski, Professor Livingston, Associate Professor Schuster, Assistant Professor Banfield, Assistant Professor Putala, Assistant Professor Gentile, Mr. Davis, Mr. Bigelow.

1. (I) and (II) Introductory Botany

The course sets forth a body of facts dealing with the morphology and physiology of plants which is not only a foundation for future professional work in biological science, but of intrinsic value to the educated layman. The topics of seed germination, ecological adaptations, floral structures, taxonomy, botanical history, cytology, wood-anatomy, plant physiology, and plant reproduction receive appropriate elementary treatment. The lectures attempt to interpret the facts of plant structure and function in the light of the major biological principles.

2 class hours; 1 3-hour laboratory period. Credit, 3.

The Staff.

25. (I) The Plant Kingdom

Selected forms typifying the slimemolds, bacteria, algae, fungi, lichens, liverworts, mosses, fernworts, and seed plants. The course has a two-fold purpose: (1) it is intended for students who desire to extend their knowledge to the principal branches of the plant kingdom, thus rounding out a general course of which Botany 1 constitutes the first part; (2) it is also planned as an introduction to certain advanced courses for which it is prerequisite.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Prerequisite, Botany 1. Mr. Davis.

26. (II) Spring Flora

Designed primarily to acquaint the student with the local spring flora through the identification of the commoner tracheate plants (lycopods, horsetails, ferns, gymnosperms, angiosperms) and the families they represent. In addition, laboratory and field work will include the study of native woody plants in the winter condition; the techniques of collection; and the use of a standard manual in the identification of plants.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

8:00-8:50 W.; 1:00-2:50 Tu. Th. or 1:00-2:50 M. F.

Prerequisite, Botany 1, Botany 25 recommended. Mr. Livingston.

28. (II) Plant Physiology

The processes occurring in plants with special emphasis on tree physiology and its relation to forestry problems.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Kozlowski.

30. (II) Plant Anatomy (1959-60)

A study of the origin and structure of vegetation and reproductive organs of seed plants. Given in alternate years.

2 class hours; 1 2-hour laboratory period. Credit, 3.
MR. PUTALA.

51. (I) Plant Pathology

A basic course in plant pathology dealing with the nature, cause and control of plant disease. Particular attention is given to disease symptoms, the phenomena of infection and of parasitism, the sources of inoculum, the agents of disease transmission, the relation of environment to disease incidence and development and to general principles of plant disease control. The laboratory phase is devoted to intensive study of a relatively few representative diseases induced by bacteria and fungi of the various classes.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
9:00-9:50 W.; 3:00-4:50 Tu. Th. MR. BANFIELD.

52. (II) Plant Pathology (1958-59)

An extension of Course 51. The objective is that of providing the student with a general knowledge of the more common and representative plant disease problems. Students are granted the option in the laboratory of specializing in disease problems in their major field of interest. Given in alternate years.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
9:00-9:50 W.; 3:00-4:50 Tu. Th. MR. BANFIELD.
Prerequisite, Botany 51.

57. (I) Microtechnique

A course in the preparation of microscopic mounts including the celloidin and paraffin methods of involving the use of microtomes and of differential stains. Enrollment limited to ten students.

3 2-hour laboratory periods. Credit, 3.
1:00-2:50 Tu. Th.; other hours by arrangement. MR. PUTALA.
Prerequisite, Botany 25.

59. (I) 60. (II) The Angiosperms (1958-59)

Alternate with Courses 61 and 62. The angiosperms are here treated from the standpoints of their structure and evolution, their taxonomy, their habits and distribution, and their economic or other special appeal to man's interests. Representatives of the dominant families, both temperate and tropical, are studied in the laboratory. The course is designed for students who want a broad knowledge of the flowering plants of the world.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Botany 1. MR. DAVIS.

61. (I) 62. (II) The Comparative Anatomy of Green Plants (1957-58)

Alternate with Courses 59 and 60. The first semester is devoted to algae and mosses; the second to tracheates, including the extinct forms.

2 class hours; 1 2-hour laboratory period. Credit, 3.
10:00-10:50 M. F.; 1:00-2:50 W. MR. SCHUSTER.
Prerequisite, Botany 25.

66. (II) General Mycology

A survey course in mycology designed to acquaint the student with the various classes of fungi, their distribution in nature, their significance in plant and animal disease, their utilization in industrial fermentations. The laboratory phase is devoted to a study of common representative forms and practice in the use of keys for their identification.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Bigelow.

67. (I) 68. (II) Introductory Plant Physiology

A study of the processes occurring in plants and their relation to the complex of activities constituting plant growth. Topics include colloidal systems, osmotic phenomena, absorption, transpiration, and internal water relations of plants, photosynthesis, fat and protein synthesis, digestion, translocation, respiration, and growth. This is a basic course for students planning for advanced work in any branch of plant science.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Kozlowski.

69. (I) Forest and Shade Tree Pathology

The nature, cause and control of the principal types of disease in trees, including decay of forest products, standing and structural timber; insects and environment in relation to fungi and disease development; morphology and identification of fungi that induce disease or decay in trees.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Mr. Banfield.

75. (I) Methods in Plant Pathology (1958-59)

A course in the general techniques and specialized methods used in the investigation of plant diseases, including isolation, culture and pathogenicity studies of representative plant pathogenes, the preparation and sterilization of various culture media, elementary staining and histological techniques, the use of the microscope, study of fungicides, and training in elementary photographic procedures. Given in alternate years.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
2:00-2:50 Tu.; 10:00-11:50 Tu.; 3:00-4:50 F. Mr. Banfield.
Prerequisite, Botany 51.

77. (I) 78. (II) Advanced Plant Physiology

Advanced study in physiology.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Hours by arrangement. Mr. Kozlowski, Mr. Gentile.
Prerequisite, one semester of plant physiology.

81. (I) Plant Ecology

A general survey of the relationship of plants to their environment including a study of environmental factors (autecology)—soil, water, temperature, light, atmosphere, and the biotic factors—and of plant communities (synecology) with special emphasis on the structure and succession of plant communities in North America.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisite, Botany 1; Botany 26 recommended. Mr. Livingston.

82. (II) Plant Geography

A survey of descriptive and historical plant geography as well as the basic principles governing the natural distributions of plants. Included as topics are problems of dispersal and migration, endemism, species senescence, discontinuous distributions, polyphlesis, continental drift, and geographical aspects of polyploidy. The course is designed for advanced undergraduates or qualified graduate students.

3 class hours. Credit, 3.
Prerequisite, Botany 81 or equivalent recommended. Mr. Livingston.

85. (I) 86. (II) Problems in Botany

Supervised problem work for qualified students.

Hours by arrangement. Credit, 1-3.
The Staff.

89. (I) Plant Cytogenetics

The interpretation of hereditary phenomena in plants in terms of cell structures. A correlation of plant cytology and genetics which is of applied as well as theoretical importance.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

90. (II) Insect Transmission of Plant Diseases

The intricate interrelationships of insects and microorganisms with particular emphasis on the basic role played by insects in inception, distribution and perpetuation of plant diseases.

3 class hours. Credit, 3.
Mr. Banfield.

BUSINESS ADMINISTRATION

Professor Kirshen, Professor Kimball, Professor Hardy, Professor O'Donnell, Associate Professor Smart, Associate Professor Ludtke, Associate Professor Singer, Associate Professor Hackamack, Associate Professor Anderson, Assistant Professor Rivers, Assistant Professor Lentilhon, Assistant Professor Drew-Bear, Mr. Zane, Mr. Fitzgerald, Visiting Lecturer Kyler.

25. (I) Introduction to Accounting I

An introduction to the principles underlying the collection, recording, and interpretation of accounting data.

3 class hours. Credit, 3.
Mr. Fitzgerald, Mr. Kyler, Mr. Lentilhon, Mr. Singer.

26. (II) Introduction to Accounting II

An introduction to the principles and procedures of accounting for corporations, partnerships and manufacturers.

3 class hours. Credit, 3.
Mr. Anderson, Mr. Fitzgerald, Mr. Kyler, Mr. Lentilhon, Mr. Singer.
Prerequisite, Accounting 25.

61. (I) Intermediate Accounting

An application of accounting principles to problems of income determination and the classification and valuation of assets.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisite, Accounting 26. Mr. Fitzgerald.

62. (II) Advanced Accounting

A continuation of Accounting 61, concerned with the valuation of assets and liabilities, accounting for net worth, statements of application of funds and the analysis of financial statements.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisite, Accounting 61. Mr. Singer.

63. (I) Cost Accounting

The use of accounting techniques to determine business costs, including process costs, standard costs, distributive costs and cost problems imposed by government regulation.

3 class hours. Credit, 3.
Prerequisite, Accounting 26. Mr. Lentilhon.

64. (II) Advanced Cost Accounting

A continuation of the theory and practice of cost accounting with emphasis on standard, estimated and distribution costs.

3 class hours. Credit, 3.
Prerequisite, Accounting 63. Mr. Lentilhon.

72. (II) Administrative Accounting and Control

The preparation and analysis of budgets, reports, and internal checks, using accounting techniques as control devices in business and industry.

3 class hours. Credit, 3.
Prerequisite, Accounting 63. Mr. Singer.

73. (I) Federal Income Tax Procedure

A study of federal income tax laws and regulations as they affect individuals; the preparation of tax returns; a study of federal security taxes.

3 class hours. Credit, 3.
Prerequisite, Accounting 26. Mr. Anderson.

74. (II) Advanced Accounting Problems

Extensive practice in solution of problems from C.P.A. examinations. Topics covered include governmental and institutional accounting, estates, trusts, receiverships, liquidations and consolidations.

3 class hours. Credit, 3.
Prerequisite, Accounting 62 Mr. Anderson.

77. (I) Auditing

A course in the verification of accounting records dealing with audit theory and procedure.

3 class hours. Credit, 3.
Prerequisite, Accounting 62 and 63. Mr. Anderson.

78. (II) Advanced Federal Tax Procedures

Advanced phases of Federal taxation with particular attention to inventories, depreciation and accounting methods. Study and preparation of returns for partnerships, corporations, estates and trusts, federal estate and gift taxes.

3 class hours. Credit, 3
Prerequisite, Accounting 73. Mr. Anderson.

FINANCE AND BUSINESS MANAGEMENT

FINANCE

55. (I) Financial Institutions

A general course which surveys the development and operations of our financial institutions and provides an integrated study of the entire American financial structure.

3 class hours. Credit, 3

Mr. Kimball, Mr. Ludtke, Mr. Rivers.

65. (I) and (II) Corporation Finance

This course in business finance is concerned with the nature and uses of corporate securities, provision and maintenance of capital, financial expansion, and corporate reorganization.

3 class hours. Credit, 3

Mr. Kimball, Mr. Ludtke, Mr. Rivers.

76. (II) Insurance

A general course concerning risks encountered by individuals and business enterprises and the methods and institutions evolved to insure against loss. Property, casualty, life and other forms of insurance are studied from the point of view of both the insurance carrier and the insured.

3 class hours. Credit, 3

Mr. Ludtke.

81. (I) Problems in Business Finance

A study of problems of financial management of various types of business enterprises and the formation of their financial policies.

3 class hours. Credit, 3.

Prerequisite, Finance 65 or consent of instructor. Mr. Ludtke.

82. (II) Investments

The principles and techniques that are useful for the analysis and selection of investment media; investment policies of individuals and institutions.

3 class hours. Credit, 3.

Prerequisite, Finance 65 or consent of instructor. Mr. Ludtke.

GENERAL BUSINESS MANAGEMENT

53. (I) Office Procedures

This course provides instruction and laboratory practice in office organization and procedures and the operation of office machines. Not offered 1957-58.

1 class hour; 4 1-hour laboratory periods. Credit, 3.

54. (II) Office Procedures

A continuation of Course 53, including the use of systems and records as managerial aids in the business office. Not offered 1957-58.

1 class hour; 4 1-hour laboratory periods. Credit, 3.

70. (I) and (II) Business Law I

This course consists of a study of the drawing, and interpretation of contracts, and includes agency, sales, and commercial paper.

3 class hours. Credit, 3.

Mr. Kirshen, Mr. Smart.

INDUSTRIAL ADMINISTRATION

72. (II) Business Law II

A continuation of Business Law 70 including the study of the legal aspects of business organization and some laws of public regulation.

3 class hours. Credit, 3.

Prerequisite, Business Law 70. MR. SMART.

75. (I) Real Estate

The essentials of real estate principles and practices; brokerage (including listing, selling and financing); the economics of urban real estate; the fundamentals of real estate evaluation and management. Not offered 1958-59.

3 class hours. Credit, 3.

91. (I) 92. (II) Independent Study and Research

For qualified seniors, independent study and research on selected problems in Business Administration. With permission of the instructor and the Dean of the School.

Credit, 1-3.

THE STAFF.

INDUSTRIAL ADMINISTRATION

11. (I) Industrial Geography

A study of the distribution of natural and human resources and the industrial and physiographic bases of the extractive and manufacturing industries.

3 class hours. Credit, 3.

MR. HACKAMACK, MR. RIVERS, MR. ZANE.

63. (I) Management in Industry

A study of the principles connected with the organization and management of industrial enterprises.

3 class hours. Credit, 3.

MR. HACKAMACK, MR. O'DONNELL.

64. (II) Personnel Management

A study of the principles of the management of labor relations. Attention is focused on procuring, developing, maintaining and using personnel.

3 class hours. Credit, 3.

MR. HACKAMACK.

65. (I) Principles of Transportation

The development and growth of transportation facilities as a function of the production and distribution of goods is examined. Rate structures and transportation laws are considered as they affect the relationships between carriers and shippers.

3 class hours. Credit, 3.

MR. RIVERS, MR. ZANE.

73. (I) Problems of Industrial Management

An intensive analysis, through study of actual cases, of the problems that confront managers in the manufacturing division of a business.

3 class hours. Credit, 3.

Prerequisite, Industrial Administration 63. MR. O'DONNELL.

80. (II) Administrative Procedure

Theory and practice of administrative organization; planning and direction in business situations; formation and execution of business policies; coordinated and effective operations through group action.

3 class hours. Credit, 3.

Mr. O'Donnell.

MARKETING

53. (I) Marketing Principles

Not open to students who have taken or are taking Agricultural Economics 55. A study of the institutions, methods, and problems concerned with the distribution of industrial and consumer goods.

3 class hours. Credit, 3.

Mr. Drew-Bear, Mr. Hardy, Mr. Zane.

54. (II) Salesmanship and Sales Management

The principles and practices of selling; the management of sales personnel; and the control of sales operations.

3 class hours. Credit, 3.

Mr. Hardy.

62. (II) Market Research

The aims, sources and fact-gathering methods of market research activities. General study and individual research projects.

3 class hours. Credit, 3.

Mr. Drew-Bear.

71. (I) Retail Merchandising

A study of the operation and productive functions of the business of retailing.

3 class hours. Credit, 3.

Mr. Drew-Bear.

73. (I) Advertising

A study of the techniques and media of advertising, its services to business and the organization and economic functions of the advertising industry.

3 class hours. Credit, 3.

Mr. Hardy.

74. (II) New England Markets

Individual and group study of the marketing problems of New England industrial enterprises. Not offered 1957-58.

3 class hours. Credit, 3.

76. (II) Purchasing

A study of the purchasing organization and practices of industrial enterprises.

3 class hours. Credit, 3.

Mr. Zane.

80. (II) Problems in Marketing

A study of problems of market management, especially the interrelation between research planning and the execution of sales programs. Effects of various marketing policies upon individual firms and the industry are examined.

3 class hours. Credit, 3.

Prerequisite, Marketing 53. Mr. Drew-Bear.

CHEMISTRY

PROFESSOR RITCHIE, PROFESSOR SMITH, PROFESSOR CANNON, PROFESSOR LITTLE, ASSOCIATE PROFESSOR RICHASON, ASSOCIATE PROFESSOR ROBERTS, ASSOCIATE PROFESSOR STEIN, ASSISTANT PROFESSOR MCWHORTER, ASSISTANT PROFESSOR CARPINO, ASSISTANT PROFESSOR STIDHAM, ASSISTANT PROFESSOR RAGLE, MR. OBERLANDER, MR. TYLER, MISS KENDROW, MRS. FESSENDEN, MRS. BULLIS, MR. WYNNE.

1. (I) 2. (II) General Chemistry

A study of the fundamental chemical laws and theories. A considerable amount of descriptive material will be included in connection with discussions of the periodic system, atomic structure, and in applications of the principles. The object of the course is to give the student a sound scientific training through a course in chemistry. Previous study of chemistry is not required.

2 class hours; 1 quiz hour; 1 2-hour laboratory period. Credit, 3.
MR. RICHASON, MR. STEIN, MR. STIDHAM, MR. OBERLANDER, MISS KENDROW, MR. TYLER.

4. (II) General Inorganic Chemistry

For students planning to major in chemistry or chemical engineering, and others who plan to continue the study of this science in preparation for their field of specialization. The course will include ionic equilibria; oxidation and reduction; electro-chemistry; the descriptive chemistry of some nonmetallic and metallic elements; the metallurgy of some common metals, and a discussion of the production of some of the more important inorganic chemicals. Applications of atomic structure and the electronic theory of valence to these subjects will be stressed.

2 class hours; 1 quiz hour; 2 2-hour laboratory periods. Credit, 4.
Prerequisite, Chemistry 1. MR. RICHASON.

29. (I) and (II) Qualitative Analysis

A study of the fundamental principles and laws concerning the behavior of solutions of electrolytes. The laboratory work deals with the characteristic properties, reactions, and the systematic separation and identification of the common cations and anions. The semi-micro technique is used throughout for the analysis of salts, salt mixtures, and alloys. A considerable portion of the laboratory work is devoted to the identification of substances unknown to the student. This course is designed to meet the needs not only of those students specializing in chemistry, but also of those students specializing in other subjects where inorganic chemistry is of importance.

2 class hours; 6 laboratory hours. Credit, 4.
8:00-8:50 or 10:00-10:50 Tu. Th.; 8:00-9:50 or 10:00-11:50 M. W. F. or 1:00-3:50 M. F. or 1:00-3:50 Tu. Th. MR. SMITH.
Prerequisites, Chemistry 2 or 4.

30. (I) and (II) Quantitative Analysis

The theory and practice of representative determinations in gravimetric and volumetric analysis are considered in detail together with analytical calculations. The laboratory work emphasizes the techniques required for accurate chemical measurements.

2 class hours; 2 3-hour laboratory periods. Credit, 4.
10:00-10:50 Tu. Th.; 1:00-3:50 M. F. or Tu. Th. or 1:00-3:50 W., 9:00-11:50 S. or 9:00-11:50 M. F. MR. ROBERTS.
Prerequisite, Chemistry 29.

33. (I) and (II) Organic Chemistry

A short course intended to satisfy the requirements in this field for all students who do not specialize in chemistry.

3 class hours; 1 3-hour laboratory period. Credit, 4.
9:00-9:50 Tu. Th. S.; 1:00-3:50 M. T. W. or Th. Mr. Carpino.
Prerequisites, Chemistry 1 and 2.

51. (I) 52. (II) Organic Chemistry

A course in the theory of organic chemistry intended to serve the needs of students who will specialize in chemistry, as well as those who may specialize in other fields where a more comprehensive course is desired than Chemistry 33. The first semester deals largely with compounds of the aliphatic series, while the benzene series is taken up in the second semester. Students electing this course should take both 51 and 52.

3 class hours; 1 3-hour laboratory period. Credit, 4.
9:00-9:50 M. W. F.; 1:00-3:50 M. W. or F. Mr. Ritchie, Mr. McWhorter.
Prerequisite, Chemistry 29.

63. (I) Chemistry of Water, Sewage and Sewage Sludge

Admission by permission of the instructor. The preparation of reagents and standard methods for the analysis of water, sewage and sewage sludge. Lectures and discussions on the sanitary significance of analytical data.

2 3-hour laboratory periods. Credit, 3.
1:00-3:50 W.; 9:00-11:50 S. Mr. Snow.
Prerequisite, Chemistry 30.

65. (I) 66. (II) Physical Chemistry

A study of the fundamental theories and laws of physical chemistry, together with the solution of problems involved in their application. The laboratory work will include practice in making physico-chemical measurements and the preparation of reports.

3 class hours; 1 3-hour laboratory period. Credit, 4.
8:00-8:50 or 11:00-11:50 M. W. F.; 1:00-3:50 M. W. or F.
Mr. Smith, Mr. Stidham, Mr. Ragle.
Prerequisites, Chemistry 30; Mathematics 30; Physics 26.

77. (I) Advanced Physical Chemistry

A detailed study of a number of topics such as kinetics, catalysis, chemical thermodynamics and electrochemistry.

3 class hours. Credit, 3.
Prerequisites, Chemistry 65 and 66. Mr. Stein.

79. (I) Elementary Biochemistry

A consideration of the more important facts relating to biological materials and processes. This course is designed primarily for students not eligible for courses 93 or 94. It is not open to chemistry majors and is not offered for graduate credit.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Chemistry 33 or 51. Mr. Little.

80. (II) Clinical Chemistry (Blood and Urine Analysis)

Work to be covered will include the collection and preparation of samples for analysis; standardization of glassware and the preparation of reagents;

description of colorimeters and the determination of certain significant compounds in the samples. The latter group will include at least sugars, proteins, non-protein, nitrogen, fatty substances and inorganic elements.
1 class hour; 1 3-hour laboratory period. Credit, 2.
Mr. Little.

81. (I) Organic Chemistry

An intensive survey of the important reactions of organic chemistry with emphasis on their scope and limitations, mechanisms, and recent developments. Admission by permission of instructor.

3 class hours. Credit, 3.
9:00-9:50 Tu. Th. S. Mr. Cannon.
Prerequisite, one year of Organic Chemistry.

82. (II) Qualitative Organic Chemistry

The characterization of organic compounds by means of physical properties, class reactions and the preparation of suitable derivatives. The laboratory work will involve the identification of a number of simple unknown compounds followed by the separation, purification, and identification of the individual components in several unknown mixtures of organic compounds. Admission by permission of instructor.

2 class hours; 2 3-hour laboratory periods. Credit, 4.
1:00-1:50 Tu. Th.; 2:00-4:50 Tu. Th. Mr. Cannon.
Prerequisite, one year of Organic Chemistry.

83. (I) Advanced Analytical Chemistry

The theory and techniques of special methods of analysis such as colorimetry, potentiometry, microscopy, ion exchange, electro-deposition and other recently developed methods of analysis. Primarily for chemistry majors but open to others with the permission of the instructor.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisites, Chemistry 30, 66. Mr. Roberts.

86. (II) Theoretical Inorganic Chemistry

A survey of inorganic chemistry which is largely theoretical and includes such topics as atomic structure, nuclear chemistry, periodic classification and relationships, valence concepts, coordination compounds, acid-base theory, and the chemistry of the commercially important elements and their compounds based upon the periodic table.

3 class hours. Credit, 3.
8:00-8:50 M. W. F. Mr. Smith.
Prerequisite, Chemistry 65.

88. (II) History of Chemistry

An historical and biographical study of chemistry and chemists. The aim of the course is: (1) to give the student a comprehensive view of the science as a whole, through a study of the development of new ideas and the establishment of new theories and laws; and (2) to arouse an enthusiastic interest in the subject and an appreciation of the true spirit of scientific research, through a sympathetic presentation of the work and lives of the great chemists who have been the creators of the chemistry of today.

3 class hours. Credit, 3.
11:00-11:50 M. W. F. Mr. Ritchie.

92. (II) Introduction Research

Admission only by permission of the department. The aim of the course is to give the student an opportunity to learn the purpose and methods of research. To each student is assigned some special subject or problem in one of the following fields of chemistry, viz., analytical, biochemical, inorganic, organic, physical.

10 laboratory hours. Credit, 5.
Hours by arrangement. THE DEPARTMENT.

93. (I) 94. (II) General Biochemistry

These courses offer a broad introduction to the general field of biochemistry for students majoring in chemistry or in the biological sciences, and provide a background for more advanced or specialized study in this field.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, Chemistry 51 and 52 or their equivalent. MR. LITTLE.

THE CLASSICS

Instructors in Romance Languages

GREEK

1. (I) 2. (II) Elementary Greek (1957-58)

For students who have had no previous study of Greek. Elements of the language and introductory readings in prose and poetry. No credits in this course may be applied toward a degree until the close of the second semester, except upon special recommendation from the Provost. Given in alternate years.

3 class hours. Credit, 3.
MR. GREENFIELD.

5. (I) 6. (II) Intermediate Greek (1958-59)

Intensive grammar review. Readings in the Homeric epics and the dialogues of Plato. The first semester is devoted to the study of the *Iliad*. Given in alternate years.

3 class hours. Credit, 3.
MR. GREENFIELD.

Prerequisites, Greek 1 and 2 or two years of high school Greek.

LATIN

1. (I) 2. (II) Elementary Latin (1957-58)

For students who have had no previous study of Latin. Elements of the language and reading. No credits in this course may be applied toward a degree until the close of the second semester, except upon special recommendation from the Provost. Given in alternate years.

3 class hours. Credit, 3.
MR. GREENFIELD.

5. (I) 6. (II) Intermediate Latin (1958-59)

Intensive grammar review. An introduction to Latin literature: Cicero and Virgil in first semester; lyric poetry (Catullus and Horace), historical prose (Livy), and other genres in second semester. Given in alternate years.

3 class hours. Credit, 3.
MR. GREENFIELD.

Prerequisites, Latin 1 and 2 or two years of high school Latin.

DAIRY AND ANIMAL SCIENCE

Professor Hankinson, Professor Foley, Professor Gaunt, Associate Professor Black, Assistant Professor Elliot†, Assistant Professor Baker, Assistant Professor Potter, Assistant Professor Greenstein, Assistant Professor Evans, Assistant Professor Wittwer, Assistant Professor Buck, Mr. Hobart.

ANIMAL HUSBANDRY

2. (II) Breeds of Livestock

This course considers the economic desirability of thirty breeds of domestic livestock. The origin, history, characteristics and distribution of the breeds of cattle, sheep, swine, and horses commercially important in the United States will be discussed.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Wittwer.

26. (II) Dairy Cattle Type Evaluation

An intensive study of dairy cattle type and its importance. The relationship of type to longevity and milk production will be discussed. During April and May trips to leading dairy cattle establishments will be made on Saturdays, cost of such trips approximately $15.00.

1 2-hour laboratory period, February and March. Credit, 1
1 4-8-hour laboratory period, April and May. Mr. Elliot.

33. (I) Elements of Meat Packing

For department majors only. The lectures will discuss the development of the modern packing industry, the history of meat inspection, the principles of meat preservation and the opportunities in this field. Laboratories include the classification of cattle, calves, sheep, and swine into proper market classes and grades and slaughtering and dressing operations with animals provided by the university farm. Wholesale and retail cuts are prepared. A one-day trip through the packing plants of Boston is a requirement of this course and will cost about $5.00.

1 class hour; 1 4-hour laboratory period. Credit, 3.
Mr. Hobart.

51. (I) Fundamentals of Animal Nutrition

This course is planned to acquaint the student with the fundamental principles of animal nutrition. It includes a study of the nature and functions of the nutrients and the nutritive requirements for maintenance, growth, reproduction, lactation, and other body functions. Emphasis will be on ruminants and swine.

3 class hours. Credit, 3.
Prerequisite, Chemistry 33. Mr. Wittwer.

52. (II) Feeds and Feeding

The fundamental principles of nutrition are applied to practical livestock feeding. This course includes methods of feed evaluation, feeding standards, formulation of rations under varying conditions, and the composition and nutritive value of livestock feeds.

2 2-hour laboratory periods. Credit, 2.
Prerequisite, Animal Husbandry 51. Mr. Wittwer.

† On leave of absence.

54. (II) Meat Processing

For students not majoring in animal husbandry, by permission of the instructor. A few periods will be devoted to a discussion of the meat packing industry and to the preserving and care of meat products. The remainder will be spent on the classification of meat animals with practice slaughtering and the making of wholesale and retail cuts with stress on identification of retail cuts. A one-day trip through the packing plants of Boston is a requirement of this course and will cost about $5.00.

1 4-hour laboratory period. Credit, 2.
Mr. Buck.

56. (II) Beef and Sheep Production

This course considers the historical and economic development, present status and probable future trends of beef and sheep production in the United States and especially in New England. Consideration will be given to types of production; systems and methods of feeding, management and marketing. In the laboratory, practice will be obtained in fitting and showing as well as certain practical techniques such as dehorning, ear-tagging, castrating, foot-trimming, shearing, etc., and the treatment and prevention of external and internal parasites as well as common ailments.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Baker.

58. (II) General Livestock Evaluation

This course acquaints the student with the methods of evaluation and selection which combine both the records and physical appearance of the animals. Demonstrations of production-testing methods will be set up and conducted by the students. Field trips will be made to nearby livestock farms, at an estimated cost to the student of $20.00.

1 4-hour laboratory period. Credit, 1.
Mr. Baker.

65. (I) Reproduction in Farm Animals

This course deals with the comparative aspects of anatomy, embryology, endocrinology and physiology of the reproductive system of farm mammals, concepts of fertility and sterility, and practice in semen collection, artificial insemination and pregnancy diagnosis. A field trip to Shrewsbury to observe operations of the M. S. B. A. bull stud is a requirement of the course and should not exceed $2.00 in cost.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Black.

66. (II) Applied Animal Genetics

This course is designed to acquaint the student with the workings of heredity and variation in farm mammals and the role of selection procedures and breeding systems in genetic improvement of livestock.

3 class hours. Credit, 3.
Prerequisite, Zoology 53. Mr. Gaunt.

72. (II) Classes and Grades of Meat

This course deals with the classification, grading and judging of carcasses and cuts of beef, veal, lamb and pork. Class work will be carried on at the abattoir and nearby packing and distributing plants. Cost of necessary trips should not exceed $5.00.

1 4-hour laboratory period. Credit, 1.
Mr. Buck.

DAIRY TECHNOLOGY

74. (II) Advanced Meats

This course deals with the advanced techniques in preparing, preserving, and utilizing the various meat products from cattle, sheep and swine.

2 2-hour laboratory periods. Credit, 2.
Mr. Hobart.

Prerequisites, Animal Husbandry 33 or 54 and permission of instructor.

77. (I) 78. (II) Dairy Cattle Production

This is an intensive course covering all phases of dairy cattle and milk production. It affords an opportunity to seek the solution to the economic, nutritional, genetic and managerial problems concerned in successful dairying. Field trips to leading dairy establishments are components of these courses, the cost to be $10.00 in the fall semester and $20.00 in the spring semester.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Foley.

79. (I) Horse and Swine Production

Light horses are emphasized in the horse production portion of the course. The feeding, breeding, training and some equitation are covered. Each student is required to care for a mare for one week. The material devoted to swine husbandry attempts to correlate all management practices and to analyze the various methods of production with emphasis on New England conditions. Field-trip cost will not exceed $5.00.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Baker.

81. (I) 82. (II) Seminar

For Animal Husbandry majors.

1 2-hour laboratory period. Credit, 1.
The Staff.

DAIRY TECHNOLOGY

25. (I) General Dairying

This course is introductory to all other courses in dairy industry and gives a general knowledge of the subject to those who wish to take only one course in dairying. The lecture portion includes the importance of the dairy industry, the composition and properties of milk, the secretion of milk, production of quality milk on the farm, methods of processing milk and cream, and the elements of ice cream, butter and cheese making. The laboratory work includes the testing of milk and milk products for fat and acidity, lactometry, and a general study of dairy plant equipment and processes.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Hankinson.

50. (II) Judging Dairy Products

A study of market standards and grades of dairy products, with practice in judging milk, ice cream, butter, and cheese. The emphasis is on recognizing quality in dairy products, detecting specific defects, and learning the causes and means of preventing common defects. A team is chosen from this class to repre-

sent the University in two contests: Eastern States Intercollegiate Dairy Products Judging Contest, and Collegiate Students' International Contest in Judging Dairy Products.

1 2-hour laboratory period. Credit, 1.
Mr. Potter.

52. (II) Market Milk

A study of the various phases of the market milk industry; sanitary production, transportation, pasteurization and handling in the city plant; marketing, delivery systems, milk and its relation to public health, inspection, milk laws, food value, and advertising. Cultured milk and other milk drinks also are included. Some milk plants are visited, the cost of the trip not exceeding five dollars.

2 class hours; 2 2-hour laboratory periods. Credit, 4.
Mr. Evans.

75. (I) Dairy Chemistry

This course is a particular study of those physical and chemical principles which not only explain the behavior of milk and milk products in the various technological operations, but also provide a basic viewpoint for dairy research. The lectures will include discussions (1) of the constituents of milk in relation to other organic compounds, and (2) the physiochemical aspects of certain dairy phenomena such as foaming, coagulation, etc. The laboratory work will include many of the tests used commercially and in dairy research, emphasizing the principles and application of both qualitative and quantitative analysis as well as the technique of operating scientific apparatus.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Potter.

77. (I) Butter and Cheese Making

Half of the semester is devoted to butter making; the remainder to cheese making, condensed and powdered milk. The various phases of the butter industry studied are: separators and cream separation; pasteurization, neutralization, and ripening of cream; preparation of starter cultures; churning; marketing and scoring of butter; creamery management. The work in cheese making includes cheddar, cream, Neufchatel, cottage, processed cheeses, etc. The manufacture of condensed milk, powdered milk, and commercial casein is also covered.

2 class hours; 2 3-hour laboratory periods. Credit, 4.
Mr. Evans, Mr. Potter.

78. (II) Ice Cream Making

The course includes a study of the principles and practices of ice cream making. The effects of such factors as composition, quality, pasteurization, homogenization, aging, and freezing on the finished products are considered. Sherbets, ices, fancy and individual forms, and all flavors of ice cream are studied. Some time is devoted to refrigeration, machinery, delivery equipment, and merchandising methods as they are related to the industry.

2 class hours; 2 3-hour laboratory periods. Credit, 4.
Mr. Potter.

79. (I) 80. (II) Seminar

For students specializing in dairy technology.

1 class hour. Credit, 1.
The Department.

ECONOMICS

PROFESSOR GAMBLE, PROFESSOR MORRIS, ASSOCIATE PROFESSOR SCHOEFFLER†, ASSOCIATE PROFESSOR HOWARD, ASSOCIATE PROFESSOR VATTER, ASSISTANT PROFESSOR LEVINSON, MR. CAMPBELL, MR. BECKER, MR. D'ANTONIO.

12. (II) Economic History of the United States

A study of the significant factors in the economic development of the nation.

3 class hours. Credit, 3.

MR. VATTER.

25. (I) and (II) Elements of Economics

Definitions and introductory principles of production, exchange, and the financial organization of society, with a short survey of the economics of distribution and the use of wealth and income.

3 class hours. Credit, 3.

THE DEPARTMENT.

26. (II) Problems of the National Economy

A continuation of Course 25. Current problems, including international economic relations, the determination and distribution of the national income, and the place of economic planning in peace and war are discussed.

3 class hours. Credit, 3.

Prerequisite, Economics 25. THE DEPARTMENT.

53. (I) Money, Banking and Credit

A critical survey of the development and operation of the monetary and banking systems of the United States.

3 class hours. Credit, 3.

MR. GAMBLE.

54. (II) Money, Income and Monetary Policy

A study of the relationship between money, income and monetary policy. It includes examination of the relationships between individuals, banks, money markets and central banks.

3 class hours. Credit, 3.

MR. GAMBLE.

Prerequisite, Economics 53 or Finance 53.

55. (I) Economics of Consumption

A study of patterns of consumption, standards of living and the sources and expenditure of individual and family incomes.

3 class hours. Credit, 3.

MR. MORRIS.

56. (II) Business Fluctuations and Forecasting

A study of business fluctuations and an analysis of current business cycle theories.

3 class hours. Credit, 3.

MR. HOWARD.

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†On leave of absence.

70. (II) The Structure of American Industry

A study of enterprise, market competition and economic development in American industries.

3 class hours. Credit, 3.

Mr. Howard.

73. (I) Modern Economic Theory and Analysis

An analysis of the mode of operation of a non-controlled free-enterprise economy. The principles of rational economic planning by business firms; the operation of various types of markets; and the balancing of conflicting forces in the entire economy.

3 class hours. Credit, 3.

Mr. Schoeffler, Mr. Vatter, Mr. Levinson.

74. (II) Current Economic Problems

An advanced course for those desirous of studying more intensively some current economic problems. Students will be encouraged to pursue lines of individual interest.

3 class hours. Credit, 3.

Mr. Levinson.

77. (I) Economics of International Trade (1958-59)

A study of the policies, principles, and practices of international trade. Given in alternate years.

3 class hours. Credit, 3.

Mr. Kinsey.

78. (II) Public Finance

Principles of public revenues and expenditures with special emphasis on the systems and problems of taxation.

3 class hours. Credit, 3.

Mr. Gamble.

79. (I) Labor Problems

An analysis of the background and character of the modern labor problem with special reference to the United States. Topics to be considered include: the problems of wages, hours, working conditions and unemployment; the trade union movement; and some agencies for the promotion of industrial peace.

3 class hours. Credit, 3.

Mr. Morris, Mr. Campbell.

80. (II) Labor Legislation

The development of American legislation with respect to labor and labor organizations as seen in its historical and social context, and in its current application.

3 class hours. Credit, 3.

Mr. Campbell.

83. (I) Social Control of Business

Methods of social control of economic activity including both formal and informal controls. The efforts to maintain, supplement, and moderate competition, and the substitution of regulation or public enterprise for competition.

3 class hours. Credit, 3.

Mr. Howard.

84. (II) Comparative Economic Systems

An examination of the various forms of economic organization that have been tried and proposed with an analysis of the economic institutions of representative current economies.

3 class hours. Credit, 3.

Mr. Schoeffler.

86. (II) Doctrinal Backgrounds of Contemporary Theory

This course is designed to review the modern beginnings of contemporary economic analysis. The foundations laid by classical theory from physiocracy through Mill are first investigated. The emergence of neoclassicism and its chief nineteenth century variants, i.e., the Lausanne, the Austrian and the English, comprise a second area of study. Finally, certain among the leading dissenters from the main currents, notably Marx, the German historical school, and Veblen, are treated.

3 class hours. Credit, 3.

Mr. Vatter.

91. (I) 92. (II) Seminar

Research in economic theory; problems of labor, commerce, and industry. If desirable, some other economic study may be substituted.

1 or 2 2-hour conferences. Credit, 1 to 3.

The Department.

EDUCATION

Professor Purvis, Associate Professor Oliver, Associate Professor Wyman, Associate Professor O'Leary, Associate Professor Anthony, Assistant Professor Trumbull, Assistant Professor Adams, Assistant Professor Wyllie, Assistant Professor Lawson, Assistant Professor Rogers, Miss McManamy, Mr. Curtis.

51. (I) and (II) History of Education

Educational movements are traced from early Greece to the present with the aim of better understanding of modern problems. Special emphasis is placed upon the function of the school in the various societies.

3 class hours. Credit, 3.

Mr. Adams, Mr. Lawson.

52. (II) Principles and Methods of Teaching

By means of discussion, case studies, and current educational literature, teaching ideals and procedures are set up. Application of the general principles are made in the major fields represented by the class. Given also in the concentrated secondary block.

3 class hours. Credit, 3.

Mr. Anthony.

53. (I) Educational Tests and Measurements

The most serviceable tests and scales for measuring achievement are considered; test construction, administration, scoring, and interpretation of results are studied and practiced. Considerable attention is given to preparation of informal tests for diagnostic and grading purposes.

2 class hours; 1 2-hour laboratory period. Credit, 3.

60. (I) and (II) Elementary School Curriculum

This course is designed to present a picture of the elementary school curriculum from the standpoint of content and methodology. Emphasis will be placed on the unit method and the activity program. Given only in the concentrated elementary block.

3 class hours. Credit, 3.

Mr. Rogers.

61. (I) and (II) Teaching of Elementary Reading and Language Arts

The main emphasis will be placed upon a development program in reading instruction. Discussions, demonstrations, and principles of effective reading practices will form a major part of the course. Methods of teaching oral and written language will be included. Given only in the concentrated elementary block.

3 class hours. Credit, 3.

Miss O'Leary.

62. (I) and (II) Teaching of Elementary Arithmetic

This course will discuss and demonstrate accepted methods and materials in the teaching of arithmetic in the elementary grades. Attention will be given to methods of correlating arithmetic with the total program of the school. Given only in the concentrated elementary block.

3 class hours. Credit, 3.

Mrs. Trumbull.

64. (I) and (II) Principles of Elementary Education

This course is designed to acquaint the student with the aim, organization, program, pupil population, etc., of the elementary school and the relationship between this level of education and the secondary school level which follows.

3 class hours. Credit, 3.

Miss McManamy.

66. (I) and (II) Preparation and Use of Audio-Visual Aids

Study is made of available media of audio-visual aids to instruction, construction of visual material, and accepted methods of use.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Wyman, Mr. Curtis.

72. (I) Vocational Education in Agriculture

This course demands certain requisites of experience and a definite objective on the part of the student to enter the field of vocational agricultural teaching which makes it necessary for the student to seek permission to enter the course. It is the first of the series of special courses (72, 73, 75) required of candidates for the vocational teacher-training certificate. A survey of vocational agricultural education and an introduction to teaching of vocational agriculture at the secondary school level is the basis of the course. Certain information and observations in preparation for the apprenticeship course are offered.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Oliver.

73. (I) and (II) Apprentice Teaching in Agriculture

For a limited number of qualified candidates in vocational agriculture education. A full year in absentia normally following the junior year in college, teaching agriculture, horticulture, and related subjects. Candidates should have completed the course in Education 72, and in Education 75, if possible and must apply before April 1 to the instructor of the course.

Maximum Credit, 6.

Mr. Oliver.

75. (II) Technique of Teaching Vocational Agriculture

This course covers the materials, methods, policies, and special requirements of Massachusetts for teaching vocational agriculture and related subjects in high schools and special country schools. This is one of three courses required of candidates for agricultural teacher training certificates.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Oliver.

Prerequisite, Education 72 or permission of the instructor.

79. (I) Methods in Adult Education

Admission only by permission of instructor. The beginning Education course for juniors and seniors who are training for extension work and for others interested in teaching adults. Generally accepted methods of group and individual instruction with adults, and methods of developing leaders to carry on the work in the field.

2 class hours; 1 2-hour laboratory period. Credit, 3.

81. (Summer) Teaching Foreign Language in Elementary School

The latest techniques, methods, and materials will be presented by instructors from the School of Education and the Department of Foreign Languages. For trainees in elementary education or elementary teachers who have a major in foreign language.

5 periods a week for 6 weeks. Credit, 3.

The Cooperating Departments.

83. (I) Principles of Secondary Education

This course presents a picture of the secondary school as a social agency, its relation to elementary and collegiate education, its aims, organizations, administration, curriculum procedures, and such other phases as are necessary to acquaint the student with the predominant level of our education ladder.

3 class hours. Credit, 3.

Mr. Anthony.

85. (I) and (II) Observation and Practice Teaching

Admission by permission of the School. An opportunity to do regular teaching in cooperating schools within commuting distance of the University. The student works under the supervision of a teacher with frequent visits from some member of the university staff. Given only in the concentrated elementary and secondary blocks.

Credit, 3-6.

The School.

Prerequisites for secondary school teaching: Education 51, Psychology 56 or their equivalent; for elementary school teaching: Education 51, 64, and Psychology 94 or Home Economics 70.

88. (I) and (II) Secondary School Curriculum

A consideration of learning material and activities and their organization in the subjects which these students are teaching, and the preparation of courses of study in those fields in the light of accepted educational practices. Given also in the concentrated secondary block.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Wyllie.

CHEMICAL ENGINEERING

Professor Lindsey, Associate Professor Cashin,
Assistant Professor Duus, Mr. Goodchild.

25. (I) Chemical Technology

An introduction to the nature and scope of the chemical industry through the study of selected chemical processes, such as common salt, sodium carbonate, sodium hydroxide, sulfuric acid, ammonia, nitric acid, methanol. The importance of economic factors and of technical factors like equiluibria and reaction rates is shown.

2 class hours. Credit, 2.
Prerequisite, Chemistry 2 or 4. Mr. Cashin, Mr. Goodchild.

26. (II) Fundamentals

An introduction to the nature and scope of chemical engineering and certain fundamental concepts, to be amplified in later courses, particularly problems dealing with material and energy balances. There is a review of the chemical, mathematical, and physical principles which are particularly applicable.

2 class hours. Credit, 2.
Prerequisites, Chemistry 2 or 4; Physics 25. Mr. Cashin, Mr. Goodchild.

55. (I) Unit Operations I

A study of the fundamental principles underlying the unit operations of fluid flow, heat transfer and evaporation. A portion of the course is devoted to a study of the thermodynamic properties of matter.

3 class hours; 2 3-hour computation periods. Credit, 5.
Mr. Cashin.
Prerequisites, Chemical Engineering 26; Mathematics 30 or 31; Physics 25.

56. (II) Unit Operations II

A continuation of Course 55, including the additional unit operations of distillation, gas absorption, liquid extraction, crystallization, filtration, mixing, crushing and grinding.

3 class hours; 2 2-hour computation periods. Credit, 5.
Prerequisite, Chemical Engineering 55. Mr. Cashin.

58. (II) Organic Chemical Technology

A study of some of the unit processes involved in the manufacture of organic chemicals. Unit processes studied include nitration, amination, halogenation, oxidation and esterification. Field trips will be included where possible.

3 class hours. Credit, 3.
Prerequisite, Chemistry 51. Mr. Duus.

75. (Summer) Instrumentation

A detailed study of the underlying principles and practices in indicating, recording and controlling instruments used on industrial process equipment.

4 class hours; 2 3-hour laboratory periods per week for six weeks. Credit, 3.
Prerequisite, Physics 26 or 28. Mr. Cashin, Mr. Lindsey.

77. (I) Elements of Unit Operations

For other than chemical engineering majors. An introduction to some of the unit operations of process industries. The emphasis is on the principles and types of equipment, rather than on the quantitative aspects and design.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisites, Chemistry 30; Physics 25, 26. Mr. Lindsey, Mr. Duus.

81. (I) Heat-energy Relations

A study of the energy relations in chemical processes. Includes: types of energy, energy balances, second law, thermodynamic functions, P-V-T relations of fluids, compression and expansion on processes.

3 class hours. Credit, 3.
Prerequisites, Chemistry 66; Chemical Engineering 56. Mr. Duus.

82. (II) Industrial Equilibria and Kinetics

A study of phase and chemical equilibria and rates of reaction in chemical processes from the industrial point of view.

3 class hours. Credit, 3.
Prerequisites, Chemistry 66; Chemical Engineering 81. Mr. Duus.

83. (I) Survey of Nuclear Engineering

An introduction to the principles of nuclear physics and a survey of problems involved in the design and operation of nuclear reactors. Among the topics to be considered are heat transfer, shielding, metallurgy, controls, waste disposal and health physics.

3 class hours. Credit, 3.
Mr. Marcus.
Prerequisites, Chemistry 1, 2; Physics 25, 26; Mathematics 29, 30, or equivalent; and permission of the instructor.

88. (Summer) Chemical Engineering Laboratory

A quantitative study of pilot plant size equipment illustrating some unit operations. Special emphasis is placed on the securing of accurate data, correct operating techniques, and on report writing. Field trips will be made when possible.

4 8-hour laboratory days per week for six weeks. Credits, 3.
Prerequisite, Chemical Engineering 56. Mr. Cashin, Mr. Goodchild.

89. (I) 90. (II) Laboratory Projects

Investigation and report on an elementary chemical engineering problem.

2 4-hour laboratory periods. Credit, 3.
Prerequisites, Chemical Engineering 56, 88. The Staff.

91. (I) 92. (II) Seminar

Preparation and discussion of professional topics of interest to chemical engineers.

1 class hour. Credit, 1.
The Staff.

93. (I) 94. (II) Comprehensive Problems

The solution of comprehensive problems which requires the application and integration of a number of the principles studied in previous courses in chemistry and chemical engineering.

2 class hours; 1 3-hour computation period. Credit, 3.
Mr. Cashin.

Prerequisites, Chemical Engineering 56; Chemistry 52, 66.

95. (I) Process Equipment Design

The design of process equipment for the chemical industries: riveted pressure vessels, welded pressure vessels, piping, attachments and closures, etc.

1 class hour; 1 3-hour laboratory period. Credit, 2.
Prerequisites, Chemical Engineering 55; Civil Engineering 53. Mr. Lindsey.

98. (II) Advanced Unit Operations

A more detailed study of certain unit operations such as unsteady-state heat transfer, and multicomponent-distillation.

2 class hours. Credit, 2.
Prerequisite, Chemical Engineering 56. Mr. Cashin.

CIVIL ENGINEERING

Professor Marston, Professor White, Professor Osgood, Professor Hendrickson, Associate Professor Marcus, Associate Professor Feng, Associate Professor Grow, Assistant Professor Sharp, Assistant Professor Boyer, Assistant Professor Higgins, Mr. Dzialo, Mr. Bemben.

27. (I) and (II) Plane Surveying

The basic principles of mensuration are discussed in class. Instruction and problems involving the use of tape, transit and level are given in the field, and the preparation of a map of a small area is carried out in the drafting room. Route surveying is considered briefly. This course is for non-majors.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Mathematics 5 or 7. Mr. Boyer.

28. (Summer) Property and Topographic Surveying

This course consists of a transit and tape property survey in which reference to Registry of Deeds records is required, and a topographic survey of a selected area using the plane table. Certain advanced topics such as triangulation and conformal coordinate systems are discussed as they relate to the topographic survey.

3 40-hour weeks. Credit, 3.
Prerequisite, Civil Engineering 25 or 27. Mr. Boyer.

30. (Summer) Route Surveying Practice

This practice course consists of a preliminary survey of a short highway location, and of the preparation of a set of plans including plan, profile and cross sections and earthwork quantities from the data recorded on the survey.

3 40-hour weeks. Credit, 3.
Prerequisite, Civil Engineering 25. Mr. Boyer.

31. (I) Surveying I

Theory of surveying, including the use, care, and adjustment of tape, transit, and level; traverse computations, topographic surveying and mapping by stadia; elementary, astronomical surveying.

1 class hour; 2 3-hour laboratory periods. Credit, 3.
Mr. Boyer, Mr. Hendrickson.

32. (II) Surveying II

Route surveys, including centerline layout; simple, compound, reverse, parabolic, and spiral curves; construction surveys; earthwork computations; chainage equations.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Civil Engineering 31. Mr. Boyer, Mr. Hendrickson.

34. (I) and (II) Statics

The following topics are considered: equilibrium of forces, friction, first and second movements, center of gravity. Algebraic and graphical methods are covered.

3 class hours. Credit, 3.
Prerequisite, Integral Calculus, previously or concurrently. The Staff.

51. (I) Strength of Materials

The following topics are considered: simple stresses and strains; combined stresses; torsion; shear and bending moments in beams; stresses and deflection of beams; columns.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Civil Engineering 34. Mr. Grow, Mr. Dzialo, Mr. Sharp.

52. (I) and (II) Dynamics

The following topics are considered: Kinematics, motion of particles, motion of rigid bodies, work and energy, power, impulse and momentum.

3 class hours. Credit, 3.
Prerequisite, Civil Engineering 34. Mr. White, Mr. Marcus, Mr. Dzialo.

53. (I) and (II) Strength of Materials

A shortened version of C.E. 51 for chemical, electrical, and mechanical engineers in the industrial option.

3 class hours. Credit, 3.
Prerequisite, Civil Engineering 34. Mr. Dzialo, Mr. Sharp, Mr. Grow.

55. (I) Transportation Engineering

A study of transportation systems with major emphasis on geometric design of highways, transportation and traffic studies, and design and operation of railroads. The laboratory periods are devoted to location and design of highways and intersections, and the design of railroad facilities.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Civil Engineering 32. Mr. Boyer.

61. (II) Testing of Materials

A study of laboratory methods for the determination of the physical properties of engineering materials and their behavior under stress.

1 class hour; 1 3-hour laboratory period. Credit, 2.
Prerequisite, Civil Engineering 51 or 53. Mr. Sharp.

63. (I) Testing of Materials

A study of laboratory methods for the determination of the physical properties of engineering materials. For mechanical engineering students.

1 3-hour laboratory period. Credit, 1.
Prerequisite, Mechanical Engineering 37. Mr. Sharp.

70. (II) Theory of Structures

The course treats the analysis of statically determinate structures of wood and steel, with reference to particular types of structures, such as industrial and office buildings, highway and railway bridges.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Civil Engineering 51. Mr. Osgood.

71. (I) Structural Design

This course is an application of the theory of structures to engineering practice through the preparation of designs and drawings for structural frames, girders and trusses in steel and wood that together make up a complete building frame or bridge. Emphasis is placed upon the design of structural members and joints.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Civil Engineering 70. Mr. Osgood.

72. (II) Advanced Structural Theory

The analysis of space frames and methods of finding deflections of trusses and beams are studied. Several methods of analysis of statically indeterminate structures are introduced. Application of the theories considered is made in the solution of practical problems during the laboratory periods.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Civil Engineering 70. Mr. Osgood.

73. (I) Reinforced Concrete Design

This course deals with the general methods of analyzing and designing reinforced concrete structures. Application is made to slabs, beams, girders, columns, walls and foundations for buildings, retaining walls and bridges. Drawings are prepared for a reinforced concrete building.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Civil Engineering 51. Mr. Osgood.

75. (I) and (II) Fluid Mechanics

The following topics are considered: properties of fluids, gas laws, viscosity, static pressure, gages, buoyant forces, dynamics of fluids, Bernoulli's theorem, flow in pipes, orifices, nozzles, weirs and open channels, hydraulic similitude and dimensional analysis.

3 class hours. Credit, 3.
Prerequisite, Civil Engineering 52, previously or concurrently. Mr. Higgins.

76. (I) and (II) Fluid Mechanics Laboratory

1 3-hour laboratory period. Credit, 1.
Prerequisite, Civil Engineering 75, previously or concurrently. Mr. Higgins.

77. (I) Sanitary Engineering I

This course treats the following topics: demand of water and quantity of sewage, hydrology relating to water resources and drainage, hydraulics of water supply systems and sewers, pumps and pumping stations, water collecting and distributing works and sewerage systems.

3 class hours. Credit, 3.
Prerequisite, Civil Engineering 75, previously or concurrently. MR. FENG.

78. (II) Sanitary Engineering II

Consideration is given to hydraulic aspects of sedimentation, flotation, aeration and recirculation, quality of water supplies, characteristics of sewage, water purification works, sewage treatment works and industrial waste problems. The laboratory periods are devoted to the practice of designing water distribution systems and sewer systems.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Civil Engineering 75. MR. FENG.

79. (I) Principles of Sanitary Engineering

This course is designed for students in the Department of Public Health. It covers phases of Civil Engineering 77 and 78 with consideration of the non-engineering background of the student. Admission by permission of the instructor.

2 class hours; 1 3-hour laboratory period. Credit, 3.
MR. FENG.

80. (II) Soil Mechanics

An elementary course in the engineering uses and properties of soils. Topics include seepage, embankment stability, and consolidation.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Geology 50. MR. HENDRICKSON.

81. (I) Foundations

Applications of soil mechanics to design and construction problems encountered in transferring structural loads to soil masses.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Civil Engineering 80. MR. HENDRICKSON.

82. (II) Soil Testing

Sampling and testing of soils for engineering purposes.

1 class hour; 2 3-hour laboratory periods. Credit, 3.
MR. HENDRICKSON.

86. (II) Sanitary Engineering Design

This is a laboratory course devoted to the design of sanitary engineering facilities, water supply and conditioning and sewerage and sewage treatment plants. Stream sanitation is considered and the latest practice and research in the sanitary engineering field are discussed.

1 class hour; 2 3-hour laboratory periods. Credit, 3.
Prerequisites, Civil Engineering 77 and 78, or concurrently. MR. FENG.

88. (II) Advanced Stress Analysis

This course is concerned with the determination of stresses and strains in structural and machine elements.

3 class hours. Credit, 3.
Prerequisite, Civil Engineering 51. MR. WHITE.

90. (II) Contracts, Specifications and Estimating

A study of the essentials of contracts as applied to business procedures in the construction field, the purposes and makeup of specifications, and the processes of estimating through quantity surveys and unit cost applications.

3 class hours. Credit, 3.

Mr. Grow.

92. (II) Professional Seminar

For seniors majoring in civil engineering. Current engineering projects are described by student reports. The professional aspect of the civil engineer's work is stressed.

1 class hour. Credit, 1.

The Department.

94. (II) Advanced Surveying

The following topics are included: Elements of astronomy, precise methods of surveying, adjustment of observations and the elements of photogrammetry.

2 class hours; 1 3-hour laboratory period. Credit, 3.

Prerequisite, Civil Engineering 32. Mr. Boyer.

96. (II) Hydraulic Engineering

The analysis and design of hydraulic structures such as storage reservoirs, spillways, dams, levees, and shore protection and channel works are considered.

2 class hours; 1 3-hour laboratory period. Credit, 3.

Prerequisite, Civil Engineering 75. Mr. Marston.

98. (II) Advanced Transportation Engineering

The engineering aspects of traffic problems, urban and rural highways and airports are discussed in the lecture periods. The laboratory periods are devoted to the design of various facilities including urban streets, traffic signals, intersections and an airport.

2 class hours; 1 3-hour laboratory period. Credit, 3.

Prerequisite, Civil Engineering 55. Mr. Boyer.

ELECTRICAL ENGINEERING

Professor Roys, Professor Langford, Associate Professor Mohn†, Associate Professor Agarwal, Assistant Professor Smith†, Assistant Professor Edwards, Assistant Professor Laestadius, Assistant Professor Fitzgerald, Assistant Professor Longley, Assistant Professor Lyttle, Assistant Professor Herald, Assistant Professor Gessert, Mr. Rosenberg.

41. (I) Fundamentals of Electrical Engineering

Direct current circuit analysis by means of Ohm's and Kirchoff's laws, nodal equations, determinants, superposition principle, reciprocity and Thevenin's theorems. The fundamental laws of electricity and magnetism and their application to problems in electrostatics, magnetostatics and electromagnetism.

3 class hours; 1 3-hour laboratory period. Credit, 4.

Prerequisites, Mathematics 6 and 31, previously or concurrently.

Mr. Agarwal, Mr. Gessert, Mr. Herald, Mr. Longley.

†On leave of absence.

42. (II) Alternating Current Circuits

The fundamentals of alternating current circuit theory. This includes instantaneous voltage and current relations, effective values, average power, representations of sinusoids by means of complex quantities, resonance phenomena, coupled and polyphase circuits, Fourier Series and metering in a-c circuits.

2 class hours; 1 quiz hour; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Electrical Engineering 41.

Mr. Agarwal, Mr. Gessert, Mr. Herald, Mr. Longley.

53. (I) Direct Current Machinery

The theory, construction, and operation of d-c motors and generators with emphasis upon analysis of performance, design features, applications and methods of control.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 41.

Mr. Longley, Mr. Agarwal, Mr. Edwards.

54. (II) Alternating Current Machinery

A basic study of single and polyphase a-c machinery, covering synchronous and induction motors and generators, converters, transformers and magnetic amplifiers. This includes analysis, design considerations, applications and an introductory study of transient behavior and unbalanced operation.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, Electrical Engineering 42, 53.

Mr. Agarwal, Mr. Longley, Mr. Edwards.

55. (I) Electronics

The theory and application of electron tubes and solid state devices. Basic theory consists of electron ballistics, electron emission, photoelectric effects and conduction in vacuum, gases and semi-conductors. Applications are made to the characteristics of electron tubes, varistors and transistors, together with their use for rectification, amplification and control. Amplifiers are analyzed by means of equivalent circuits and graphical methods.

2 class hours; 1 quiz hour; 2 laboratory hours. Credit, 3.
Prerequisite, Electrical Engineering 42.

Mr. Langford, Mr. Laestadius, Mr. Herald.

56. (II) Applied Electronics

Analysis and design of vacuum-tube and transistor circuits from the standpoints of response, distortion and stability. Applications include Class A, B and C, grounded-cathode, grounded-grid, cathode-follower and inverse feedback circuits, cascaded amplifiers, and the fundamental theory and characteristics of vacuum tube oscillators and multi-vibrators. Modulated waves, frequency conversion and detection are also considered.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 55.

Mr. Laestadius, Mr. Langford, Mr. Herald.

57. (I) Engineering Analysis

Ordinary differential equations as applied to electrical and mechanical systems; vector algebra and calculus; electro-magnetic field theory through the derivation of Maxwell's field equations and the Poynting and Schelkunoff

radiation vectors; reflection and refraction of plane waves; skin effect in round conductors and Bessel's functions.

3 class hours. Credit, 3.
Prerequisites, Mathematics 32; Electrical Engineering 42.
Mr. Fitzgerald, Mr. Roys.

58. (II) Electrical Transmission

A continuation of Course 57, consisting of the fundamental theory of waveguides, radiation from antennas, traveling waves in transmission systems, steady state a-c performance of long lines, and the solution of uniform recurrent network problems by means of difference calculus.

3 class hours. Credit, 3.
Prerequisite, Electrical Engineering 57. Mr. Fitzgerald, Mr. Roys.

61. (I) 62. (II) Principles of Electrical Engineering

For mechanical, industrial and agricultural engineering students. A study of d-c and a-c circuits and machinery and basic electronics.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, Physics 26; Mathematics 32. Mr. Lyttle.

63. (I) and (II) Elements of Electrical Engineering

For civil and chemical engineering students. A study of d-c and a-c circuits and machines with application to industrial problems.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisites, Physics 26; Mathematics 32. Mr. Lyttle, Mr. Rosenberg.

64. (II) Industrial Electricity

An elective for mechanical, industrial and chemical engineering students which deals principally with the applications of electronics to measurement and control in industry.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Electrical Engineering 62 or 63. Mr. Lyttle, Mr. Smith.

78. (II) Special Projects

A laboratory course, associated with a selected technical elective (as approved by the student's major adviser), in which the student carries out a study or project of particular interest to himself, with a minimum of supervision, and wherein he is expected to learn to do independent work. A written report is required at the conclusion of the project.

1 3-hour laboratory period. Credit, 1.
Prerequisite, a suitable technical elective concurrently. The Department.

79. (I) Electrical Communications I

The general theory of four-terminal, and selective circuits and of the use of distributed parameter systems as circuit elements. Among the special expedients employed are matrices, duality, Foster's reactance theorem, and transmission charts. Applications are made to attenuators, filters, equalizer and delay networks, and to long lines.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 58. Mr. Langford.

80. (II) Electrical Communications II

Theory and applications of circuits for radio communication in which wideband and R-F amplifiers, oscillators, modulation, de-modulation, frequency conversion, pulse techniques, noise, interference and information theory are studied.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 56. MR. LANGFORD.

81. (I) Advanced Electrical Machinery

A continuation of Course 54 dealing with modern methods of machine analysis. These are developed and applied to the predetermination of the transient and short circuit behavior and stability of synchronous machines and to variable speed and single phase motors.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 54. MR. ROYS.

83. (I) Transient Analysis

A study of the transient behavior of electrical, mechanical and thermal systems. The ordinary and partial differential equations associated with the systems are set up and their solutions obtained by the classical, Heaviside operational and Fourier and Laplace transform methods. An introductory survey of functions of a complex variable leads to the evaluation of the inversion integral by means of the method of residues.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 58. MR. FITZGERALD, MR. ROYS.

84. (II) Industrial Electronics

A study of special characteristics of the electron tubes of industry, the theory, design and operation of commercial types of circuits utilizing these tubes, including stroboscope, grid-controlled and polyphase rectifiers, inverters, welding controllers, speed and voltage regulators, high frequency heating circuits, and others.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 55. MR. ROYS.

85. (I) Electrical Measurements

Theory and practice of electric and magnetic measurements; accuracy, precision, and limitations of measurements devices.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Electrical Engineering 42. MR. FITZGERALD, MR. LAESTADIUS.

86. (II) Power System Networks

This course is a study of power system networks including power transfer diagrams, voltage studies, system stability criteria, short-circuit calculations, and protective methods.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, Electrical Engineering 54, 58. MR. EDWARDS.

87. (I) Power Applications and Control

A study of the application of electric machines and their controls. Torque relations, typical control systems, theory of relays, combinational and sequential relay systems and counting circuits are among the topics considered.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, Electrical Engineering 54 and 57. MR. EDWARDS.

90. (II) Feedback Control Systems

The analysis and design of basic types of error-sensitive control systems and their components, including servomechanisms. Analytical and graphical methods for the determination of steady state and transient performance of the several types of controllers are developed. Applications are made to typical systems involving electrical, mechanical and hydraulic components.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 83. Mr. Roys.

92. (II) Professional Seminar

Current engineering developments are discussed through student reports. The professional aspects of the electrical engineer's work is stressed. Instruction is given in the preparation of engineering papers for publication and in their presentation before technical audiences.

1 class hour. Credit, 1.
The Department.

94. (II) Microwave Engineering

A review of the fundamental principles of communications and electromagnetic fields and their application to the special problems of the generation, transmission, propagation and reception of microwaves. This also includes characteristics and specifications of standard equipment, and special training in general laboratory and commercial testing techniques.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 79. Mr. Roys.

96. (II) Principles of Electrical Design

The fundamentals of electric, dielectric, magnetic and heat-flow systems as applied to the design, rating and life of coils, transformers, machinery and other electrical equipment.

2 class hours; 1 3-hour calculation period. Credit, 3.
Prerequisite, Electrical Engineering 54. Mr. Roys.

98. (II) Television Engineering

Application of electronics and radio engineering to the special problems of television. Among the topics considered are system theory and analysis, signal sources, video response, noise limitations, synchronization and scanning, color vision and colorimetry, principles of the NTSC system, picture pickup and display tubes, transmission and reception, and monitoring and testing procedures.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, Electrical Engineering 83, and 80 previously or concurrently.
Mr. Langford.

MECHANICAL ENGINEERING

Professor Weaver, Professor Bates, Professor Swenson, Professor Keyser, Associate Professor Dittfach, Associate Professor Longstaff, Associate Professor Sobala, Associate Professor Weidmann, Assistant Professor Day, Assistant Professor Costa, Assistant Professor Patterson, Assistant Professor Harrington, Assistant Professor Hopkins†, Assistant Professor Hunter, Assistant Professor Kroner, Assistant Professor O'Byrne, Mr. Spencer, Mr. Powell.

1. (I) Engineering Drawing

The purpose of this course is to develop skill in the use of drafting equipment and to provide a working knowledge of orthographic projection. Included

are such topics as lettering, multi-view drawing, sections, dimensions, working drawings and various pictorial representations. The course also includes some work in freehand sketching and ink tracing.

2 3-hour laboratory periods. Credit, 2.
Mr. Weidmann.

2. (II) Descriptive Geometry

This course covers the theory of orthographic projection more fully. It includes the representation of the geometric concepts of lines, planes and solids and the solution of engineering problems involving true sizes, angles and shapes by graphical methods.

1 class hour; 2 3-hour laboratory periods. Credit, 3.
Prerequisite, Mechanical Engineering 1. Mr. Weidmann.

23. (Summer) Shop

The course is designed primarily for engineers other than mechanical. Approximately half the semester is spent in welding; in the other half the student gains experience in the machine shop, where he becomes familiar with the various machine and hand tools used in metal working.

3 40-hour weeks. Credit, 3.
Mr. Costa.

27. (Summer) Shop

The course covers weldability of metals, manual and automatic welding processes. Experience is gained in the manual welding of various metals.

3 40-hour weeks. Credit, 3.
Mr. Patterson.

28. (Summer) Machine Shop

A knowledge of metal-working equipment is obtained by using the fundamental machine tools such as the lathe, planer, shaper, milling machine and drill press. A reasonable amount of bench work is included. Classroom work is devoted to the theory of machine tool operation, fits, tolerances and measurement.

3 40-hour weeks. Credit, 3.
Mr. Costa.

37. (I) and (II) Basic Engineering Materials

Properties of engineering materials; failure by inelastic action, creep, fatigue, and corrosion. The crystalline nature of metals. Properties and uses of the structural metals, wood, stone, clay products, cementing materials, plastics, and rubber.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisites, Chemistry 2 or 4; Physics 27, taken previously or concurrently.
Mr. Keyser, Mr. Harrington.

39. (II) Materials of Construction

A shortened version of Mechanical Engineering 37 for civil engineering majors.

2 class hours. Credit, 2.
Prerequisites, Chemistry 2 or 4; Physics 27, taken previously or concurrently.
Mr. Keyser.

46. (II) Fundamentals of Metallurgy

Physical metallurgy involving crystal structure, solid solutions, diffusion in the solid state, freezing of metals, hardening of metals, annealing, and equilibrium diagrams. These fundamentals are applied to a study of the iron-iron

carbide diagrams, time-temperature-transformation relationships for steel, the heat treatment of steel, and heat-treating equipment. Laboratory work is intended to substantiate some of the principles developed in lecture work and to acquire basic skill in metallographic technique.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Mechanical Engineering 39 or Chemistry 66. Mr. Keyser.

61. (I) Heat Power

A one-semester terminal course for non-mechanical engineering majors, designed to present to the student the fundamental principles involved in the production of power. It consists of the basic theory underlying the field of thermo-dynamics and its application to power machinery. It includes a study of gases, vapors, thermodynamic processes, cycles and power measurement with considerable discussion, both quantitative and qualitative, of the application of the above to gasoline engines, diesel engines, gas turbines, steam turbines, and compressors.

3 class hours. Credit, 3.
Prerequisites, Physics 28; Mathematics 6. Mr. Sharp.

63. (I) Engineering Thermodynamics I

This course is a treatment of the application of the laws of heat to various energy-transforming devices. Topics include ideal and actual cycles of steam, internal combustion engines, and air compressors together with problems pertaining to these machines, energy transformations in fluid flow, variable specific heats and mixtures of gases.

4 class hours. Credit, 4.
Prerequisites, Physics 26 or 28; Mathematics 30 or 31.
Mr. Swenson, Mr. Longstaff.

64. (II) Engineering Thermodynamics II

A continuation of the work of Course 63. Study will be made of liquids and vapors, thermodynamic cycles, energy transformations and the transfer of heat, together with engineering problems pertaining to these devices.

3 class hours. Credit, 3.
Prerequisite, Mechanical Engineering 63. Mr. Swenson, Mr. Longstaff.

65. (I) Heat Engineering I

This course is a survey of the field of applied energy and is designed for engineering students outside of the mechanical engineering field. The application of the laws of heat to energy transforming devices is studied, but not as extensively as in Courses 63 and 64. A study will be made of gases, vapors, fuels, combustion, heat transfer, measurement of power, and internal combustion engines.

3 class hours. Credit, 3.
Prerequisites, Physics 28; Mathematics 6. Mr. Longstaff, Mr. O'Byrne.

66. (II) Heat Engineering II

A continuation of the work of Course 65. Air compressors, fans, refrigeration, and air conditioning turbines, jet propulsion and power plants will be studied.

3 class hours. Credit, 3.
Prerequisite, Mechanical Engineering 65. Mr. Longstaff, Mr. O'Byrne.

67. (II) Mechanical Instrumentation Laboratory

The calibration and application of instruments used in the testing of mechanical engineering apparatus.

1 3-hour laboratory period. Credit, 1.
Prerequisite, Mechanical Engineering 63 concurrently.

68. (II) Kinematics

Principles of mechanism, including velocity and acceleration diagrams, instant centers, gear teeth and gear trains, eams, and various speed transmissions.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisites, Mechanical Engineering 1; Civil Engineering 52.
MR. BATES, MR. SOBALA.

74. (I) and (II) Basic Aerodynamics

An introduction to the basic concepts of applied aerodynamics, for the student who has no previous background in the subject. Topics include properties of air, ideal fluid flow, airfoils and their properties, aircraft performance and stability.

3 class hours. Credit, 3.
Prerequisite, Civil Engineering 76. MR. SOBALA.

75. (I) Steam Power Plants

This course is a study of the steam power plant, including boilers, stokers, fuels, combustion, steam generation, prime movers, and auxiliary equipment, and engineering problems involved in design and operation.

3 class hours. Credit, 3.
Prerequisite, Mechanical Engineering 64. MR. SWENSON.

76. (II) Refrigeration and Air Conditioning

The course content includes a study of the fundamental principles of thermodynamics as applied to refrigeration and air control. Application of refrigeration to industrial processes and the control of temperature, humidity and motion of air in buildings will be studied.

3 class hours. Credit, 3.
Prerequisite, Mechanical Engineering 64. MR. SWENSON.

77. (I) Internal Combustion Engines

A study is made of spark-ignition and compression-ignition engines including design, fuels, carburetion, ignition, combustion, lubrication, cooling, and engine performance. The gas turbine and jet propulsion will be included.

3 class hours. Credit, 3.
Prerequisite, Mechanical Engineering 64. MR. DITTFACH.

79. (I) Mechanical Engineering Laboratory I

Tests of fuels and lubricants. Performance tests of steam engines and turbines, gasoline and Diesel engines, fans, hydraulic apparatus, refrigeration systems and other typical engineering equipment. Emphasis on laboratory procedure and orderly presentation of results.

1 3-hour laboratory period. Credit, 1.
Prerequisites, Civil Engineering 75 or 76 concurrently; Mechanical Engineering 64 or 66; Mechanical Engineering 67 for Mechanical Engineering majors.
THE DEPARTMENT.

80. (II) Mechanical Engineering Laboratory II

This course continues the work of the first semester in more advanced phases.

2 3-hour laboratory periods. Credit, 2.
Prerequisite, Mechanical Engineering 79. The Department.

81. (I) Experimental Mechanical Engineering

For non-mechanical engineering majors. Calibration and application of instruments used in the testing of mechanical engineering apparatus. Performance tests on mechanical engineering equipment such as internal combustion engines, steam power apparatus, refrigeration machines, and fans and blowers.

2 3-hour laboratory periods. Credit, 2.
Prerequisites, Mechanical Engineering 66; Civil Engineering 75 concurrently.
The Department.

82. (II) Heat Transfer

Methods of evaluating heat transfer rates and predicting operating temperatures. Heat transfer by conduction, radiation, and convection. Topics include one- and two-dimensional conduction, heat flow, transient heat flow, fins, numerical and graphical solutions, free and forced convection and radiation.

3 class hours. Credit, 3.
Prerequisites, Mechanical Engineering 64; Mathematics 32 or 92. Mr. Day.

83. (I) Machine Design

Principles involved in the design of various machine parts including fastenings, shafts, belts, bearings, gears, and pressure vessel.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisites, Civil Engineering 51 or 53; Mechanical Engineering 2, 68.
Mr. Bates.

84. (II) Basic Engineering Analysis

The application of mathematical methods to the solution of mechanical engineering problems in such fields as vibrations, elasticity, fluid mechanics, and dynamics. The analysis of the problems and the derivation of the governing equations will receive particular emphasis.

3 class hours. Credit, 3.
Prerequisites, Mathematics 32 or 92. Mr. Sobala, Mr. Day.

85. (I) Dynamics of Machinery

Elements of vibration theory, vibration isolation, absorbers, instrumentation, analysis of equivalent masses and shaft systems. Dynamic balancing.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, Civil Engineering 52; Mechanical Engineering 68.
Mr. Sobala.

86. (II) Advanced Machine Design

A continuation of Course 83. Additional elementary parts are studied which combine into the design of complete machines in the latter part of the course.

2 class hours; 1 3-hour laboratory period Credit, 3.
Prerequisite, Mechanical Engineering 83 Mr. Bates.

INDUSTRIAL ENGINEERING

87. (I) Engineering Thermodynamics III

Topics investigated include steam turbines, steam power plants, refrigeration, high-velocity flow, and shock phenomena.

3 class hours. Credit, 3.
Prerequisite, Mechanical Engineering 64. Mr. Day.

88. (II) Steady Flow Machinery

The principles of thermodynamics are applied to steam and internal combustion turbines, condensers, and other heat transfer apparatus.

3 class hours. Credit, 3.
Prerequisites, Mechanical Engineering 64 or 66; Civil Engineering 76.
Mr. Swenson.

90. (II) Advanced Metallurgy

Advanced topics in engineering metallurgy, such as the effects of alloying elements in steel, aluminum, magnesium, and copper alloys. The significant properties of, the fabricating methods for, and the applications of ferrous and nonferrous metals. Admission by permission of instructor.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Mechanical Engineering 46. Mr. Keyser.

91. (I) Professional Seminar

For senior and graduate students only. Presentation of papers on various important subjects in the field of mechanical engineering with principal emphasis on recent developments.

Credit, 1.
The Department.

94. (I) or (II) Experimental Mechanical Engineering

Special work in mechanical engineering for a senior thesis. Admission by permission of instructor.

Credit, 1-3.
The Department.

INDUSTRIAL ENGINEERING

25. (I) Manufacturing Processes

The methods of producing and fabricating the basic engineering materials: metals, cementing materials, ceramics, plastics, rubber, and lumber. Production methods (excluding machining) of metal parts and their assembly in a typical mass production industry is discussed. Laboratory periods involve inspection trips and movies.

1 class hour; 1 3-hour laboratory period. Credit, 2.
Mr. Keyser.

26. (Summer) Tool Engineering

This course includes the determination of the manufacturing operations necessary to produce a finished product. This is followed by consideration of the principles embodied in the design of jigs, fixtures, dies, and gauges necessary to perform each operation. The economics of tooling as influenced by intermittent or continuous type manufacturing and the effect of volume are also included.

3 44-hour weeks. Credit, 3.
Mr. Costa.

51. (I) Industrial Management

A course designed to acquaint the student with the principles of industrial engineering and their application to the solution of the problem of industrial plant operation.

3 class hours. Credit, 3.
MR. WEAVER.

54. (II) Engineering Economy

This course includes a study of the bases for comparison of alternatives in engineering projects, break-even and minimum cost points, evaluation of proposals for new activities, economy of operations, the evaluation of public activities, the output and life of typical items of engineering and industrial equipment, manufacturing lot sizes, economic purchase quantities, the selection and replacement of structures and machines.

3 class hours. Credit, 3.
Prerequisites, Economics 25; Mathematics 6 or 29. MR. HUNTER.

75. (I) Job Evaluation

A study of the principles used to determine an evaluation of all occupations in order to establish an equitable rating between them, to establish sound wage and salary policies.

2 class hours. Credit, 2.
Prerequisite, Industrial Engineering 51. MR. WEAVER.

76. (I) Time Study

A study of the principles involved in the establishment of production standards and their application in the management functions of cost accounting, estimating, production control, incentives, budgetary control. Development of standard data.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Industrial Engineering 82. MR. HUNTER.

77. (I) Production Control

A study of the principles used to regulate production activities in keeping with the manufacturing plan.

3 class hours. Credit, 3.
Prerequisite, Industrial Engineering 51. MR. HUNTER.

78. (II) Factory Planning and Layout

A study of the principles applying to the determination and development of the physical relationship between plant, equipment and operators working toward the highest degree of economy and effectiveness in operation.

1 class hour; 1 3-hour laboratory period. Credit, 2.
Prerequisites, Mechanical Engineering 2; Industrial Engineering 51.
MR. WEAVER.

80. (II) Plant Budgetary Control

A study of the principles used to pre-determine expenses for the factors of production and the comparison of results with the estimates to determine and deal with the causes of expense variations as applied by the operating organization in the industrial plant.

3 class hours. Credit, 3.
Prerequisite, Industrial Engineering 51. MR. WEAVER.

82. (II) Work Simplification

A study of the principles involved in the simplification of means of doing work and in the application and use of these principles.

1 class hour; 1 3-hour laboratory period. Credit, 2.
Prerequisite, Mechanical Engineering 68. Mr. Weaver.

86. (II) Industrial Management

Designed for students other than industrial engineers. A broad course dealing with the many problems encountered in a modern industry. Topics include types of organization, management, plant location, arrangement of equipment, product design, methods of production control, costs, wage payment systems and personnel relations.

3 class hours. Credit, 3.
Mr. Hunter.

88. (II) Motion and Time Study

This course covers the combined fields of motion study and time study for junior and senior students outside the industrial engineering field.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Mr. Hunter.

92. (I) Professional Seminar

For senior and graduate students.

Credit, 1.
The Department.

ENGLISH

Professor Goldberg, Professor Rand, Professor Helming, Professor O'Donnell, Professor Varley, Associate Professor Allen, Associate Professor Lane†, Associate Professor Koehler†, Assistant Professor Horrigan, Assistant Professor Williams, Assistant Professor Kaplan, Assistant Professor Barron, Assistant Professor Mitchell, Assistant Professor Rudin, Assistant Professor Page, Mrs. Wright, Mrs. Hogan, Mrs. DuBois, Mr. Clark, Mr. Madeira, Mr. Tucker, Mr. Haven, Mr. Savage, Mr. Collins, Mrs. Smith, Mrs. Barron, Mr. Deminoff, Mr. Copeland, Miss Reid.

COMPOSITION

1. (I) 2. (II) English Composition

The purpose of the course is to teach effective exposition for use in college and professional work. College-level readings will be used to attain this end and to acquaint the student (1) with the commoner critical terms and literary forms and (2) with the skills necessary to the comprehension of mature writing.

2 class hours. Credit, 2.
The Department.

81. (I) 82. (II) Creative Writing

A course in critical and imaginative composition based upon the examples of standard authors and the experience of the student. It provides an opportunity for work in description, narrative, verse, and drama, as well as in exposition. The chief emphasis first semester is on fiction and poetry; second semester,

†On leave of absence.

on non-fiction. English 82 is a continuation of 81 but may be elected independently.

3 class hours. Credit, 3.
Prerequisite, a mark of A or B in English 2 (U. of M.) or permission of the instructor. THE DEPARTMENT.

83. (I) (II) Technical Writing

For majors in engineering. A course in factual and inductive exposition with special emphasis upon process reports and theses.

2 class hours. Credit, 2.
Prerequisites, English 1, 2. MR. MITCHELL.

84. (II) Technical Writing

For students not majoring in engineering. A course in factual and inductive exposition with special emphasis upon library research and the preparation of reports, and theses.

3 class hours. Credit, 3.
Prerequisites, English 1, 2. MR. MITCHELL.

LITERATURE

25. (I) 26. (II) Humane Letters

A general reading course based upon a chronological selection of masterpieces: classical, continental, and English.

THE DEPARTMENT.

50. (II) Chaucer

A study of Chaucer's development and preeminence as a creative artist and an attempt to appreciate his humanism.

3 class hours. Credit, 3.
MR. HELMING.

51. (I) The Renaissance in England

A study of various aspects of the Renaissance as revealed in such writers as Spenser, Bacon, Sir Thomas Browne, Burton, and Hobbes. Special emphasis is given to Spenser's *Faerie Queene.*

3 class hours. Credit, 3.
MR. LANE.

53. (I) Lyrical Poetry of the Renaissance in England (1959-60)

A study of lyrical poets such as Sidney, Campion, Jonson, Herrick, Lovelace, Suckling, Carew, Donne, Herbert, Vaughan, Crashaw, Traherne and Marvell. Emphasis is given to the "Metaphysical" tradition. Given in alternate years.

3 class hours. Credit, 3.
MR. GOLDBERG, MR. BARRON.

54. (II) Milton

The development of the mind and art of Milton as Renaissance writer. Emphasis is placed on *Paradise Lost, Paradise Regained,* and *Samson Agonistes.*

3 class hours. Credit, 3.
MR. GOLDBERG, MR. HELMING, MR. KOEHLER.

55. (I) Shakespeare

This course is based upon the reading of about twenty-five of Shakespeare's plays, and attempts both to indicate the evolution of the dramatist and to emphasize the various phases of his art.

3 class hours. Credit, 3.

Mr. Rand.

57. (I) English Literature of the Restoration

A study of the social problems and literary values of the Restoration period as they appear in prose, verse, and drama. Emphasis will be placed on the satire of Dryden; and on the development of the theatre from the Restoration through Congreve and the Comedy of Manners.

3 class hours. Credit, 3.

Mr. Koehler.

58. (II) Elizabethan Dramatists

A study of English drama from the death of Elizabeth to the closing of the theaters. Special consideration will be given to the plays of Jonson, Beaumont, Fletcher, Webster, Middleton, Massinger, and Shirley.

3 class hours. Credit, 3.

Mr. O'Donnell.

59. (I) English Literature of the Eighteenth Century

A study of the literature of the Augustan Age, with special emphasis on the writing of Swift and Pope.

3 class hours. Credit, 3.

Mr. Barron.

60. (II) English Literature of the Eighteenth Century

A continuation of English 59, but may be elected independently. A study of the literature of the later Eighteenth Century with special emphasis on the Johnson Circle.

3 class hours. Credit, 3.

Mr. Barron.

61. (I) Romantic Poetry (1958-59)

A study of the Lake Poets (primarily Wordsworth and Coleridge) and their precursors. Given in alternate years.

3 class hours. Credit, 3.

Mr. Rand.

62. (II) Romantic Poetry (1958-59)

A continuation of English 61 but may be elected independently. A study of Byron, Shelley and Keats. Given in alternate years.

3 class hours. Credit, 3.

Miss Horrigan.

63. (I) American Poetry

A study of American poetry from Colonial times to 1900, with special emphasis upon the work of Freneau, Bryant, Emerson, Longfellow, Whittier, Poe, Whitman, and Emily Dickinson.

3 class hours. Credit, 3.

Mr. O'Donnell, Mr. Williams.

65. (I) English Prose of the Nineteenth Century

A study of the chief Romantic prose writers in relation to literary techniques and main currents of epochal thought and feeling. Among the authors treated are Coleridge, Lamb, Hazlitt, DeQuincey, Landor, Carlyle, and Ruskin.

3 class hours. Credit, 3.

Mr. Goldberg.

66. (II) English Prose of the Nineteenth Century

A continuation of English 65, but may be elected independently. A study of the chief Victorian prose writers in relation to literary techniques and main currents of epochal thought and feeling. Among the authors treated are Macaulay, Newman, Arnold, Mill, Huxley, Pater, and Stevenson.

3 class hours. Credit, 3.

Mr. Goldberg.

67. (I) Modern Continental Drama in Translation

A study of Continental European drama from Ibsen to the present day. Through the study of approximately twenty representative plays, the course will present a survey of the main currents in late nineteenth-century and twentieth-century European drama.

3 class hours. Credit, 3.

Mr. Rudin, Mrs. Hogan.

68. (II) Modern Drama

This course traces the development of continental English and American drama from the time of Ibsen to the present day. Its purpose is to impart an intelligent and enthusiastic interest in the drama of the twentieth century.

3 class hours. Credit, 3.

Mr. Rand, Mr. Williams.

69. (I) Victorian Poetry (1959-60)

A study of Tennyson and Browning. Given in alternate years.

3 class hours. Credit, 3.

Mr. Rand.

71. (I) Biography (1959-60)

The history of the biography as a literary type; discussion of leading biographers from Boswell to Maurois, with special emphasis upon the development of the modern biographical method. Given in alternate years.

3 class hours. Credit, 3.

Mr. Helming.

72. (II) The Bible as Literature

A study of the King James version of the Bible, with emphasis upon the Hebrew as discernible in translation, the poetic qualities characteristic of Tudor England, and the varied influence of the Bible upon subsequent English poetry.

3 class hours. Credit, 3.

Mr. Rand.

73. (I) The Novel from Defoe through the Victorians

The development of the novel; the reading and discussion of eight or nine great English novels of the eighteenth and nineteenth centuries.

3 class hours. Credit, 3.

Mr. Allen, Mr. Helming.

74. (II) Greek Classics in Translation

Readings and discussion of the epics of Homer, representative dramas of Aeschylus, Sophocles, Euripides, and Aristophanes, the "Socratic" dialogues of Plato, and Thucydides' history of the Peloponnesian War. Intended to acquaint students with the famous myths and stories of classical antiquity, and the literary forms and ideas which have contributed most to subsequent literatures.

3 class hours. Credit, 3.

Mr. Helming, Mr. Kaplan.

76. (II) Modern Poetry

This course attempts to trace the spirit of twentieth century poetry from such authors as Hardy, Whitman, and Emil Dickinson to those of the present day.

3 class hours. Credit, 3.

Mr. Rand, Miss Horrigan.

77. (I) The Modern Novel

An analytical presentation of eleven or twelve novels written between 1890 and 1920, in which the expanding form and the extension of critical themes will be stressed.

3 class hours. Credit, 3.

Mr. Varley.

78. (II) The Contemporary Novel

A continuation of English 77, covering about twelve novels written between 1920 and 1950, with some consideration of social issues reflected in the fiction. English majors will not elect both English 77 and 78.

3 class hours. Credit, 3.

Mr. Varley.

79. (I) Literary Criticism (1959-60)

A study of major critical attitudes and principles, in relation to practice and philosophic background. Emphasis is placed upon important critics and theorists from Plato and Aristotle through those of the eighteenth century. Given in alternate years.

3 class hours. Credit, 3.

Mr. Goldberg.

80. (II) Literary Criticism (1957-58)

A continuation of English 79, but may be elected independently. Emphasis is placed upon important critics and theorists of the nineteenth and twentieth centuries. Given in alternate years.

3 class hours. Credit, 3.

Mr. Goldberg.

85. (I) Major American Writers

A study of a selected group of the major American writers of the nineteenth and early twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, Henry James, Henry Adams, Fitzgerald, and Hemingway. A careful analysis will be made of the varying literary forms given to such dominant themes as nature and the conflict between the individual and society.

3 class hours. Credit, 3.

Mr. O'Donnell.

86. (II) Major American Writers

A study of a selected group of the major American writers of the nineteenth and early twentieth centuries, including Cooper, Poe, Melville, Thoreau, Whitman, Mark Twain, Stephen Crane, Sinclair Lewis, and Faulkner. A careful analysis will be made of the varying literary forms given to such dominant themes as nature and the conflict between the individual and society.

3 class hours. Credit, 3.

Mr. Kaplan.

87. (I) Problems in American Literary and Linguistic Studies

An exploration of problems connected with the study of American language and literature in the context of American culture and cultural interrelationships.

Credit, 1-3.

Mr. Goldberg and Visiting Lecturer.

88. (II) Problems in Language and Literature

Intended for English majors but open to others by permission and in accordance with the nature of the current offering. An exploration of developments in literary and linguistic methodology and theory, and in the study of language and literature. Readings will be drawn largely from important English writers, but relevant material from other languages and literature will be used.

Credit, 1-3.
Mr. Goldberg and Visiting Lecturer.

95. (I) The Symbolist Tradition in English Poetry

An intensive study of symbolist elements in the poetry of Blake, Coleridge, the Pre-Raphaelites, Hopkins, and Yeats, and a survey of some of the significant criticism dealing with these writers.

3 class hours. Credit, 3.

ENTOMOLOGY

Professor Alexander, Professor Sweetman, Associate Professor Shaw, Associate Professor Hanson, Assistant Professor Smith, Mr. Weidhaas.

26. (II) General and Field Entomology

The lectures are devoted to a brief survey of the entire field of entomology; structure and metamorphosis; the more important methods and materials for control of injurious species; a survey of the more conspicuous and important insects with particular attention to the fauna of New England. A laboratory period will be devoted to the preparation and formation of a collection of insects. Until about April 10th, this work will be done indoors and will consist of lectures and practical work preparatory to the field work after that date. Collections made by the students are studied in later courses.

2 class hours; 1 2-hour laboratory period. Credit, 3.
8:00-8:50 or 10:00-10:50 M. F.; 1:00-2:50 M. Tu. W. or Th.
Mr. Alexander, Miss Smith.

51. (I) Pests of Special Crops

For students not specializing in entomology who desire a more complete knowledge of the insects connected with their major lines of work. Work in the laboratory consists of identification, life-history studies and control measures of important insect pests. Work of this nature is available on pests of field crops, market-garden crops, fruits, flowers, shade trees and shrubs, forest trees, household articles, domestic animals, and man.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
10:00-10:50 M.; 1:00-2:50 Tu.; 2:30-3:50 Th. Mr. Weidhaas.
Prerequisite, Entomology 26.

53. (I) Applied Entomology

Studies on the more important insect pests, their life-histories, damage, identification, and methods of control. Special attention is devoted to the use of entomological literature, methods of preparing scientific papers, and the general principles of insect control.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
10:00-10:50 W.; 3:00-4:50 M. F. Mr. Shaw.
Prerequisite, Entomology 26.

55. (I) 56. (II) Classification of Insects

Laboratory work on the identification of the major orders of insects. In Course 56, the immature stages of insects, with particular stress on their structures and recognition.

3 2-hour laboratory periods. Credit, 3.
8:00-9:50 Tu. Th. S. Mr. Alexander, Miss Smith.
Prerequisites, Entomology 26; Entomology 57, previously or concurrently.

57. (I) Insect Morphology

The lectures treat of the external and internal anatomy, particularly of the major orders, stress being placed upon the phylogenetic relationships, as backgrounds for parallel and subsequent work in taxonomy and physiology of insects.

1 class hour; 3 2-hour laboratory periods. Credit, 4.
10:00-10:50 F.; 1:00-2:50 M. Tu. Th. Mr. Hanson.
Prerequisite, Entomology 26.

60. (II) Structural Pest Control

For students specializing in entomology, especially those desiring to enter the structural pest field, and others interested in gaining knowledge of methods of combating insect and rodent pests. The emphasis will be placed on the control of those pests attacking buildings and other structures, foods, fabrics, and other stored products in private homes or other establishments. The life history, feeding habits, methods of reproduction, and dispersal of the various species will be stressed in so far as these influence control measures.

2 class hours. Credit, 2.
11:00-11:50 M. F. Mr. Sweetman.
Prerequisite, Zoology 1; Entomology 26 desirable.

72. (II) Forest and Shade Tree Insects

The lecture work deals with the principles and methods of controlling insects which attack shade trees, forests and forest products. The laboratory periods are devoted to a study of the more important species, their identification, biology, and specific control measures.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisite, Entomology 26; 53 55, 56, and 57 desirable. Mr. Hanson.
1:00-1:50 M.; 2:00-3:50 M.; 1:00-2:50 F. or 10:00-11:50 Tu.; 10:00-10:50 Th.; 1 hour by arrangement.

74. (II) Medical and Veterinary Entomology

The relationships of insects and their allies to the health of man and animals. The classification, biology and control of these pests is studied in detail.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
10:00-10:50 W.; 3:00-4:50 Tu. Th. Mr. Shaw.
Prerequisite, Entomology 26.

79. (I) Animal Ecology

Designed for students specializing in entomology, zoology, and related fields. The course deals with the relation of animals to their environment, covering the physical factors as temperature, moisture, light, etc., and biotic factors as neighbors, competitors, predators, etc. Both terrestrial and aquatic communities are studied. The student is shown not only that animals do things, but

why they make definite responses to the environmental factors. Actual measurements of the environmental factors and responses of the animals in the field and laboratory are included.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 M. F.; 3:00-4:50 M. Mr. Sweetman.
Prerequisite, Entomology 26 or Zoology 1, or equivalent.

80. (II) Insect Control

The scientific basis of insect control is considered from the chemical, biological, ecological, mechanical, and legislative approaches. Special emphasis is placed on the composition, manufacture, preparation, and reaction of insecticides, and the use of resistant hosts, micro-organisms and the larger parasites and predators that might be used in the control of insects.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
9:00-9:50 M.; 3:00-4:50 M. F. Mr. Sweetman.
Prerequisites, Entomology 53, 55, and 57; 79 and 81 desirable.

81. (I) Physiological Entomology

A detailed consideration is given to the organ systems, showing the functions such as nutrition, respiration, and growth, and the relationship of physiology to behavior. A portion of the laboratory time will be devoted to assigned individual problems dealing with any phase of insect biology or control and conducted on a research basis.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
9:00-9:50 Th.; 3:00-4:50 W. F. Mr. Sweetman.
Prerequisite, Entomology 26; 55, 56, and 57 desirable.

87. (I) 88. (II) Special Problems in Entomology

Problem work in many fields, as apiculture, biological control and insectary practice, insecticides, morphology, and classification. Intended primarily to introduce qualified students to research methods in some branch of entomology. Excess graduation credits are necessary for election.

Hours by arrangement. Credit, 1, 2, or 3.
Prerequisites, Entomology 26, 53, 55, 57, and should be preceded or accompanied by any other courses in the restricted field of the problem.

The Department.

89. (I) Entomological Techniques

Theory and practice in the preservation, preparation, and mounting of insects for study and display. Excess graduation credits are necessary for election.

2 2-hour laboratory periods. Credit, 2.
Hours by arrangement. Miss Smith.
Prerequisites, Entomology 26 and permission of instructor.

90. (II) Evolution

The phylogeny of plants and animals is outlined at some length in conjunction with consideration of factors and forces influencing and guiding evolution. Especial consideration is given throughout the course to the implications and applications of evolutionary concept to human behavior, welfare and philosophy.

2 class hours. Credit, 2.
10:00-10:50 M. F. Mr. Hanson.

APICULTURE

66. (II) Introductory Beekeeping

This course is designed to give the student a broad grasp of the general field of apiculture. The lectures cover honeybees and their relatives, biology of the bee, methods of management, diseases, pollination, queen rearing, honey production, and history of beekeeping. The laboratory will acquaint the student with the structure of the bee, equipment for keeping bees and its construction, costs of beekeeping, plants of value for bees, and as much as possible the actual management of bees in the apiary.

2 class hours; 1 2-hour laboratory period. Credit, 3.
11:00-11:50 M. F.; 1:00-2:50 M. Mr. Shaw.

85. (I) Advanced Beekeeping

This course is designed for the student who wants more detailed knowledge of the management of bees. It will cover such topics as fall management, wintering, the care of the honey crop, grading and packaging of honey, judging honey, bee diseases, beeswax, and some simple biometrical problems relating to bees. If possible, one or more visits to commercial apiaries will be made.

1 class hour; 1 2-hour laboratory period. Credit, 2.
Prerequisite, Entomology 66. Mr. Shaw.

FOOD TECHNOLOGY

Professor Esselen, Professor Levine, Associate Professor Fagerson, Associate Professor Averill, Assistant Professor Baker, Assistant Professor Livingston, Assistant Professor Cournoyer, Mr. Lambert.

51. (I) Introductory Course

This is a general elementary course, primarily for food technology majors, covering food economics, production, distribution and processing. The applications of fundamental science to the food industries are pointed out. The laboratory exercises cover both the theory and practice of canning, freezing and dehydration. The principles of packaging are considered. Fruit and vegetable products are prepared and graded.

2 class hours; 1 2-hour laboratory period. Credit, 3.
8:00-8:50 Tu., Th.; 1:00-2:50 Th. or F. Mr. Averill.

52. (II) Food Products and Adjuncts

This is a continuation of Course 51. The laboratory work includes pickles and pickle products, maple products, citrus products, fruit syrups, soups, condiments, and the preservation of meat, fish, poultry, and vegetables. The properties and uses of sugars, syrups, brines, enzymes, acids, salt, pectin, preservatives and antioxidants are considered. Experience is given in the use and handling of instruments and equipment.

2 class hours; 1 2-hour laboratory period. Credit, 3.
8:00-8:50 Tu., Th.; 1:00-2:50 W. or Th. Mr. Averill.
Prerequisite, Food Technology 51.

61. (I) Industrial Technology

A survey of commercial practices in the manufacture and preservation of food products. This will involve a study of equipment, factory arrangement,

sanitation, government regulations, and the operation of types of commercial equipment in quantity production.

1 class hour; 1 4-hour laboratory period. Credit, 3.
10:00-10:50 Th.; 1:00-4:50 M. or Tu. Mr. Levine.
Prerequisites: Food Technology 52; Bacteriology 31.

62. (II) Industrial Technology

This is a continuation of Course 61. The class exercises will deal largely with a survey study of the sources of raw material, commercial methods of manufacture, packing and distribution of the more common foods. The important contributions of research to food technology will be studied. Laboratory work will include the formation of research projects, interpretation of research data, the use of preservatives, the simple analysis of foods and the commercial practices as applied to preservation of such materials as are available: fish, meats, poultry, and spring vegetables. The inspection and grading of canned food will be studied. Various plant visits including a two-day field trip to food plants in the Boston area will be taken. The trip will cost the student about fifteen dollars.

1 class hour; 1 4-hour laboratory period. Credit, 3.
10:00-10:50 Th.; 1:00-4:50 M. or Tu. Mr. Levine.
Prerequisite, Food Technology 61.

71. (I) 72. (II) Food Science Literature

For seniors who specialize in food technology.

2 class hours. Credit, 2.
11:00-11:50 M., W. The Department.

75. (I) and (II) Food Preservation

For students not majoring in food technology. A survey is made of the causes of food spoilage and of the methods commonly used in preserving foods. The important food products are discussed with emphasis on raw materials used, processing methods and examination of packaged foods. Methods of detecting and preventing spoilage are studied. The laboratory exercises cover the preservation of the major food groups. The theory and use of the pressure cooker are included.

2 class hours; 1 2-hour laboratory period. Credit, 3.
11:00-11:50 Tu.; 12:00-12:50 Th.; 3:00-4:50 Th. Mr. Livingston.

82. (II) Confections and Cereal Products

The materials offered in this course are as follows: the home manufacture of fruit preserves, candied and glacéed fruits, pastes, confections, candies, and other specialties. Approximately one-half the semester is devoted to elementary work in candy making. This course will also consider the principles of baking, doughs, various cereal products and dry mixes. Not offered 1957-58.

2 2-hour laboratory periods. Credit, 2.
3:00-4:50 W. F. Mr. Levine.

85. (I) 86. (II) Marine Products Technology

A survey of marine products of commerce and industry. Canning, curing, and freezing of seafoods. Chemical and micro-biological aspects of the industry. By-products, industrial problems and scientific literature. Emphasis is placed on the New England fisheries. The lectures may be taken without the laboratory hours.

2 class hours; 1 2-hour laboratory period. Credit, 3 or 2.

FOOD MANAGEMENT

91. (I) Analysis of Food Products

Laboratory studies on the grading of foods, examination of foods for adulteration, testing accessory products for quality, and determining the causes of spoilage or deterioration in processed food products. Physical, chemical, microbiological, and microscopical methods will be employed. Training in the use of the A.O.A.C. Standard Methods. Enrollment limited to 18.

1 class hour; 1 4-hour laboratory period. Credit, 3.
9:00-9:50 Th.; 1:00-4:50 Th. or F. Mr. Livingston.
Prerequisites: Food Technology 52; Bacteriology 31; Chemistry 30.

92. (II) Objective Analytical Methods and Instrumentation

For students specializing in food technology. This is a continuation of Course 91. It includes interpretation of analysis, sanitation and food laws, government grading of processed foods, use of manuals and the technical work of trade associations. Laboratory work includes use of all kinds of laboratory and field equipment and apparatus used in food plants.

1 class hour; 1 4-hour laboratory period. Credit, 3.
9:00-9:50 Th.; 1:00-4:50 Tu., W., or Th. Mr. Livingston.
Prerequisite, Food Technology 91.

96. (II) Introductory Research Methods

For food technology majors. The application of the fundamental sciences to food technology research.

Hours by arrangement. Credit, 2.
The Department.

98. (II) Sensory Evaluation Methods

An introduction to sensory measurements in the evaluation and acceptance of foods. Panel tests and their statistical interpretation; taste, odor, color, and texture measurements; application to food quality control and grading. For seniors only.

1 class hour; 1 2-hour laboratory period. Credit, 2.
Mr. Fagerson.

FOOD MANAGEMENT

33. (I) Introductory Food Management

An introductory course in restaurant and hotel operations, including selection of site and financing.

3 class hours. Credit, 3.
9:00-9:50 M. W. F. Mr. Baker.

67. (I) Food Preparation and Service

Catering; quantity production with commercial types of equipment—baking, sauces, pastries; radar cookery. Actual participation at one of the University kitchens and in catering at special events.

1 class hour; 1 4-hour laboratory period. Credit, 3.
11:00-11:50 Tu.; laboratory hours by arrangement. Mr. Cournoyer.

68. (II) Kitchen Administration

A general study of problems arising in operation of a commercial kitchen. Attention is given to layouts and floor plans with emphasis on equipment, design, installation, maintenance, sanitation and depreciation. Food control and

economy. Considerable time is devoted to personnel procurement and training problems, job breakdown and specifications. Various types of table service and highlights of dining room supervision are included.

2 class hours; 1 2-hour laboratory period. Credit, 3.
11:00-11:50 M. F.; laboratory hours by arrangement. Mr. Cournoyer.

77. (I) Food Service Practices

Functional study of personnel. Duties of managers, stewards, cooks, etc. Menu making; types of catering service. Advertising and promotion methods. Requirements for special functions. Labor procurement and policies. Job training and evaluation. Cost controls.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 Tu. Th.; laboratory hours by arrangement. Mr. Cournoyer.

78. (II) Stewarding

This is a study of practices used by hotels and restaurants pertaining to purchasing, receiving, and issuing food, beverages, and other supplies. It includes storeroom procedures, issue systems, and internal check methods, principles of food and beverage cost control, menu planning and pricing. A study of trade practices.

3 class hours. Credit, 3.
11:00-11:50 M. W. F. Mr. Baker.

FORESTRY AND WILDLIFE MANAGEMENT

Professor Rhodes, Professor Holdsworth, Professor Trippensee, Professor Rich, Assistant Professor MacConnell, Assistant Professor Mader, Assistant Professor Abbott, Mr. Cole*, Mr. Bond.

25. (I) Wood Anatomy and Identification

A basic anatomical study of wood elements, their various structural characteristics and functions; relation of structure and properties to use; microscopic study of wood elements; practice in identification.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Rich.

26. (II) Dendrology

The taxonomic features, silvical characteristics and geographical distribution of the principal forest trees of temperate North America, and the description of the forests in which they occur; identification of the native and naturalized woody plants occurring in the forests of the Northeastern United States, in summer and winter conditions, by means of keys and first-hand examination.

2 class hours; 2 2-hour laboratory and field periods. Credit, 3.
Mr. Rhodes, Mr. Holdsworth, Mr. Abbott.

51. (I) Forest Management of Watersheds

For non-forestry majors only. A study of forest site—water factor relationships; the improvement of watershed forests through applied silviculture; relative suitability of tree species for watershed uses; forest protection measures.

3 class hours; special field trips. Credit, 3.
Mr. Holdsworth.

* On leave of absence for military service.

FORESTRY

53. (I) Silvics

Forest ecology as a foundation for silvicultural practice: the physiological basis of forest ecology; environmental factors, their effect upon vegetation, and how they are influenced by it; the development and silvical habits of the individual tree; the development, characteristics and classification of forest communities; plant indicators; methods for the study and analysis of vegetation and its environment.

2 class hours; 1 4-hour laboratory and field period. Credit, 3.

Mr. Rhodes.

54. (II) Forest Soils

The structure, development and maintenance of forest soils; their relationship to applied silviculture and forest productivity; the literature of forest soils with special reference to American experience.

2 class hours; 1 4-hour laboratory period. Credit, 3.

Mr. Mader.

55. (I) (1959-60) and (Summer) The Elements of Forest Mensuration

The measurement of trees, stands, and forest products; field and office practice in timber estimating and log scaling, use of mensurational instruments, and the collection and compilation of forest inventory data.

2 class hours; 1 4-hour laboratory period. Credit, 3.

Summer course: 3 44-hour weeks. Mr. MacConnell, Mr. Bond.

56. (II) The Principles of Silviculture

The methods of establishing and developing forest stands through the application of silvicultural practice. Intermediate cuttings and reproduction systems. Field work in silviculture, including the marking and cutting of forest stands, is given on University forest property.

2 class hours; 1 4-hour laboratory period. Credit, 3.

Mr. Rhodes, Mr. Holdsworth.

57. (I) Forest Economics and Policy

The forest as a resource yielding direct forest values and social benefits; the history of American forestry and the development of a forest policy together with the role of the forest in American economy.

3 class hours. Credit, 3.

Mr. Holdsworth.

59. (I) Forest Protection

The principles of protecting forests from all harmful agencies but with special reference to the prevention and control of forest fires, insects, and disease. Other agencies are treated in accordance with their importance.

3 class hours. Credit, 3.

Mr. Abbott.

62. (II) The Management of Small Woodlands

For non-forestry majors only. A study of the production of wood as a crop from small forested areas. Silvicultural methods to improve wood quality and increase quantity; measurement of tree and stand volumes; harvesting and use of primary forest products.

2 class hours; 1 4-hour laboratory period. Credit, 3.

Mr. Bond.

71. (I) Aerial Photogrammetry

Principles of photogrammetry leading to the application of aerial photography in forest management, wildlife biology, and other fields concerned with large land surfaces. Photographic interpretation and map making from aerial photographs are laboratory activities.

2 class hours; 1 4-hour laboratory period. Credit, 3.
Mr. MacConnell, Mr. Bond.

75. (I) Manufacture and Distribution of Forest Products

A study of the techniques of manufacturing forest products, including production and cost studies; the seasoning, grading and special processing prerequisite to marketing.

3 class hours. Credit, 3.
Mr. Rich.

76. (II) Wood Technology

The structure, composition and properties of wood in relation to its economic utilization; wood-liquid relationships as they affect seasoning, preservation, and technological process for industrial purposes; a survey of the technological advances in the use of wood.

3 class hours. Credit, 3.
Mr. Rich.

78. (Summer) Harvesting of Forest Products

The theory and practice of forest harvesting in the several U. S. forest regions; field practice in the harvesting and preparation of direct forest products from the felling of standing timber through the log-making, skidding, transportation and sawing processes to the stacking of lumber. Short field trips are made to active forest properties where harvesting is proceeding and a longer trip is made to New Hampshire and Maine to visit pulpwood and timber operations and manufacturing plants.

3 44-hour weeks. Credit, 3.
Mr. Bond, Mr. MacConnell.

80. (II) Principles of Forest Management

Multiple-use management of forest land, organization of the forest for sustained-yield management, the principles of forest management plans and a study of several plans currently in use on large American forests, the preparation of a management plan for a 10,000-acre tract of forest in the vicinity of the University, forest regulation.

3 class hours; 1 4-hour laboratory period. Credit, 5 or 3.
Laboratory period optional for non-forestry majors. Mr. MacConnell.

81. (I) Regional Silviculture

The practice of silviculture as applied in the several forest regions of the United States. Emphasis is given to the factors, both natural and economic, which govern silviculture in these regions.

3 class hours. Credit, 3.
Mr. Rhodes.

82. (II) Artificial Propagation of Forests, and Forest Tree Improvement

Reproductive characteristics of forest trees; artificial propagation of forest stands by direct seeding and forest planting; nursery management and problems;

fundamentals of tree improvement through provenance tests, selection of superior phenotypes, and hybridization.

2 class hours; 1 4-hour laboratory period. Credit, 3.
Mr. Abbott.

85. (I) Air Seasoning and Kiln Drying

A study of the proper conditioning of wood products by air seasoning and kiln drying, of moisture relations in the wood, and of kiln operation.

3 class hours. Credit, 3.
Mr. Rich.

WILDLIFE MANAGEMENT

27. (I) Conservation of Natural Resources

Natural resources of the United States including soil, water, forests, wildlife, and the important minerals, the historic background of their use and their present status in relation to the social and economic welfare. Includes the discussion of various conservation problems in relation to national prosperity.

3 class hours. Credit, 3.
10:00-10:50 M. W. F. Mr. Trippensee.

52. (Summer) Conservation of Natural Resources

A study of the conservation of basic natural resources including soil, water, forests, wildlife, metallic and non-metallic minerals, and the sources of energy including atomic energy. Not open for credit to those having credit in Wildlife Management 27.

3 2-hour and 2 4-hour laboratory periods. Credit, 4.
Mr. Trippensee.

70. (II) Wildlife Management

Life histories, ecology, and management of common game birds and mammals, including a study of natural habitats and methods of management.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Trippensee.

71. (I) Wildlife Management (1958-59)

Life histories, ecology, and management of waterfowl. Includes a study of natural habitats and method of management. Given in alternate years.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Trippensee.

72. (II) Forest-Animal Relationships

For students majoring in Forestry. The influence of animals on the forest; effects of forest practices on wild animal production; economic aspects of forest-animal relationships.

3 class hours. Credit, 3.
Mr. Trippensee.

73. (I) Wildlife Management

Life histories, ecology, and management of predaceous birds and injurious mammals. Particularly designed for those who seek employment with the rodent control division of U. S. Fish and Wildlife Service.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Trippensee.

74. (II) Techniques in Wildlife Management (1958-59)

Admission by permission of instructor. Quantitative field studies of wild animals of forest and farm; cover mapping, habitat studies, census, food habits, and damage of game animals. For students interested in state and federal employment through civil service. Given in alternate years.

1 class hour; 1 4-hour laboratory period. Credit, 3.
Mr. Trippensee.

75. (I) Wildlife Management (1959-60)

Life histories, ecology, and management of the furbearers. Includes a study of natural habitats, management and fur farm problems. Given in alternate years.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Trippensee.

84. (II) Seminar (1957-58)

Study and discussion of problems in the relation of agriculture and forestry, to the use and control of wildlife resources. For juniors and seniors majoring in wildlife management. Given in alternate years.

3 class hours. Credit, 3.
Mr. Trippensee.

85. (I) Wildlife Literature

A review of the more pertinent literature relating to vertebrate animals and their ecology.

1 2-hour seminar. Credit, 2.
Mr. Sheldon.

GEOLOGY AND MINERALOGY

Professor Smith, Associate Professor Farquhar, Assistant Professor Nelson, Assistant Professor Johansson, Mr. Rice, Mr. Dodge, Mr. Messinger, Mr. Bazakas.

1. (I) and (II) Physical Geology

A survey of the nature and origin of the earth's landscape features, rocks, and structures, and the dynamics of their development, including the work of earthquakes, volcanoes, mountain building, rivers, waves and currents, and glaciers.

2 class hours; 1 3-hour laboratory period. Credit, 3.
The Department.

28. (II) Historical Geology

An introductory study of the origin and age of the earth, the interpretation of the geologic time scale, the development of continents and oceanic basins and their relief features, and the evolution of life in a changing world.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Geology 1. The Department.

50. (I) Engineering Geology

Not open to geology majors. A general course in engineering geology stressing earth structure, the dynamic processes, and agents of weathering. The laboratory work consists of mineral and rock-determination and map-reading as related to the phenomena of physical geology.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Mr. Socolow.

GEOLOGY AND MINERALOGY

51. (I) 52. (II) Mineralogy

A course designed to meet the needs of students majoring in geology and allied fields. The first semester's work deals with all of the mineral classes with the exception of the silicate group which has been reserved for the second semester.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisites, Chemistry 1 and 2. Mr. Nelson.

53. (I) Structural Geology

A study of the origin of rock structures, their occurrence, and recognition. Field and laboratory problems emphasize the structure present in the Connecticut Valley.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisite, Geology 1. Mr. Farquhar.

56. (II) Lithology

A descriptive study of the classes of rocks with reference to manner of origin, modes of occurrence, structural features and the chemical and petrographic distinction within each group.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisites, Geology 1, 51, 52 (previously, or with permission, concurrently.)
Mr. Nelson.

60. (II) Principles of Physical Geography

A systematic study of the world's physiographic provinces, climate, vegetation, soils, mineral resources, and their effects upon mankind. The geographic relationships to land forms will be stressed. Not available for major credit in geology.

3 class hours. Credit, 3.
Mr. Johansson.

63. (I) Invertebrate Paleontology

A study of the history, development and identification of invertebrate animal fossils. Field trips by arrangement.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisites, Geology 28; Zoology 1. Mr. Johansson.

64. (II) Plant Paleontology

A study of the history, development, and identification of plant fossils. Field trips by arrangement. Not offered 1957-58.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

72. (II) Geologic Field Mapping

An introduction to the instruments and techniques used in field mapping, and their application to the geologic mapping of selected areas.

8 field hours. Credit, 3.
Prerequisites, Geology 53, 56 (may be taken concurrently).
The Department.

78. (II) Principles of Stratigraphy

An examination of the principles of stratigraphic correlation and their application to the problems of the major rock units of the United States. Field

and laboratory work consists primarily of problems related to the eastern United States.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisites, Geology 1, 28, Course 53 recommended. Mr. Dodge.

89. (I) Geomorphology

A review of recent studies concerning rock structures, weathering, streams, underground water, shorelines, wind work, volcanoes, and mountains. Field trips by arrangement.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisites, Geology 1, 28, 53. Mr. Smith.

91. (I) Photogeology

A laboratory study of the instruments and methods employed in making measurements and preparing base maps and geologic maps from vertical and oblique aerial photos.

2 3-hour laboratory periods. Credit, 3.
Prerequisite, Geology 53; Course 72 recommended. Mr. Smith.

94. (II) Pleistocene Geology

A study of Pleistocene world geology consisting of geological processes, land forms, existing and extinct glaciers, biota and stratigraphy. Field trips by arrangement.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Geology 28 or permission of instructor, Course 89 recommended.
Mr. Smith.

97. (I) 98. (II) Special Problems

For seniors specializing in geology.

6 laboratory hours. Credit, 3.
Hours by arrangement. The Department.
Prerequisite, 21 hours of geology or permission of department.

GERMAN

Professor Ellert, Associate Professor Heller, Mr. Stawiecki, Mr. Lea, Miss. Schiffer, Mrs. Trahan.

1. (I) 2. (II) Elementary German

Grammar, prose composition, and reading. No credits in this course may be applied toward a degree until the close of the second semester, except upon special recommendation from the Provost.

3 class hours. Credit, 3.
The Department.

25. (I) 26. (II) Intermediate German

German prose, poetry and drama. Grammar review.

3 class hours. Credit, 3.
Prerequisites, German 1 and 2. The Department.

28. (II) Scientific German

Intensive and extensive readings of scientific texts in various fields taken from standard German works.

3 class hours. Credit, 3.
Prerequisites, German 25. THE DEPARTMENT.

51. (I) Nineteenth Century Prose (1958-59)

A study of the *Novelle* from the death of Goethe to 1890 (early realism to naturalism) with emphasis on literary and social forces in the work of Tieck, Stifter, Keller, and others. Given in alternate years.

3 class hours. Credit, 3.
Prerequisites, German 25 and 26. MR. HELLER.

52. (II) Poetry and Drama of the Nineteenth Century (1958-59)

A study of the development of the drama and of lyric poetry from 1830 to 1890 with special emphasis on dramatic works of Grillparzer, Hebbel, and Hauptmann and the poetry of Mörike, Storm, and C. F. Meyer. Given in alternate years.

3 class hours. Credit, 3.
Prerequisites, German 25 and 26. MR. ELLERT.

53. (I) Twentieth Century Prose (1959-60)

Main literary currents in contemporary German prose from Nietzsche to Hesse with particular attention to the work of Thomas Mann, Kafka, and Werfel. Given in alternate years.

3 class hours. Credit, 3.
Prerequisites, German 25 and 26. MR. HELLER.

54. (II) Poetry and Drama of the Twentieth Century (1957-58)

Reading and discussion of significant lyrical works of Hofmannsthal, George and Rilke, and representative dramas by Hauptmann and Georg Kaiser. Given in alternate years.

3 class hours. Credit, 3.
Prerequisites, German 25 and 26. MR. LEA.

55. (I) Storm and Stress

A study of storm and stress in German literature centering in the young Goethe.

3 class hours. Credit, 3.
Prerequisites, German 25 and 26. MR. ELLERT.

56. (II) Romanticism (1958-59)

A study of the poetry and prose writings of the romantic period from Novalis to Heine. Given in alternate years.

3 class hours. Credit, 3.
Prerequisites, German 25 and 26. MR. ELLERT.

57. (I) Goethe's *Faust*

3 class hours. Credit, 3.
Prerequisites, German 25 and 26. MR. HELLER.

58. (II) Middle High German (1958-59)

Readings of Middle High German texts in the original with an introduction to the grammar. Given in alternate years.

3 class hours. Credit, 3.
Prerequisites, German 25 and 26.

59. (I) The Germanic Languages (1959-60)

An introduction to general and Germanic philology for German and English majors; a survey of the relationship between German, English, and the other Indo-European tongues and of the historical development of German and English as the two major Germanic literary languages. Given in alternate years.

3 class hours. Credit, 3.

67. (I) German Masterpieces in Translation

An attempt to assess Germany's literary contribution to the Western heritage through a study of German literary monuments, ranging from the Middle Ages to the present, from the *Lay of the Nibelunge* and *Parsival* to Thomas Mann's *Magic Mountain* and Werfel's *Star of the Unborn.* Admission by permission of department.

3 class hours. Credit, 3.

68. (II) German Literature of the Middle Ages (1957-58)

A survey of the literature of the German language from the earliest literary documents to the 15th century, with readings in modern German translation of the Nibelungenlied, Gudrun, Parzival, Tristan, Der arme Heinrich, and the lyrics of Walter von der Vogelweide. Given in alternate years.

3 class hours. Credit, 3.
Mr. Ellert.

79. (I) 80. (II) German Conversation and Composition

Practice in the oral and written language.

4 class hours. Credit, 3.
3:00-4:50 Tu. Th. Miss Schiffer.
Prerequisites, German 25 and 26, or permission of instructor.

GOVERNMENT

Professor Harris, Associate Professor Goodwin, Assistant Professor Tinder, Assistant Professor Allen, Mr. Mainzer, Mr. Braunthal, Mr. Hampton.

25. (I) and (II) American Government

A study of the principles, machinery, dynamics and problems of government in the United States.

3 class hours. Credit, 3.
The Department.

26. (II) European Government

A survey of the politics and governmental institutions of Great Britain, France, U.S.S.R., and other European countries.

3 class hours. Credit, 3.
Mr. Allen, Mr. Harris, Mr. Tinder, Mr. Braunthal.

51. (I) Municipal Government

A survey of the governmental structure and function of American municipalities.

3 class hours. Credit, 3.

Mr. Goodwin, Mr. Gillespie.

52. (II) American Foreign Policy

An analysis of the principles of American foreign policy. Constitutional, political, and administrative considerations which influence the formulation and execution of American foreign policy. Special emphasis on current issues.

3 class hours. Credit, 3.

Mr. Allen, Mr. Braunthal.

53. (I) International Relations

The nation-state system and conceptions of national interest in modern world politics. The forms and distribution of power by which states seek to implement national interests. The making of foreign policy and methods of adjusting international conflict. Attention will be given to current international problems.

3 class hours. Credit, 3.

Mr. Allen.

54. (II) State Government (1957-58)

A study of state politics, organization and functions, with emphasis on the role of the state in our Federal system. Given in alternate years.

3 class hours. Credit, 3.

Mr. Goodwin.

55. (Summer) The Presidency in American Government

The growth of the executive in United States Government. Varying conceptions of the presidential office. Constitutional and political aspects of the office in legislation, administration and conduct of foreign and military affairs. The president as party leader.

5 periods a week for 6 weeks. Credit, 3.

Prerequisite, Government 25. Mr. Braunthal.

56. (II) The Legislative Process (1958-59)

A study of the role of the legislature in national and state government. The functions of legislatures, legislative procedures, and the role played by political parties and pressure groups in the legislative process. Given in alternate years.

3 class hours. Credit, 3.

Mr. Goodwin.

61. (I) Public Administration

A study of organization and management in modern government, with emphasis on the bureaucracy's role in public policy formation.

3 class hours. Credit, 3.

Mr. Mainzer.

62. (II) Administrative Law (1957-58)

A study of governmental activities in the regulation of industry, agriculture, and labor, with emphasis on the legal framework within which these activities operate. Given in alternate years.

3 class hours. Credit, 3.

Mr. Mainzer.

63. (I) Political Parties and Elections

A study of the American political process, with emphasis on parties, pressure groups, and public opinion.

3 class hours. Credit, 3.

Mr. Goodwin.

65. (I) Constitutional Law

An historical study of the United States Constitution as interpreted by decisions of the Supreme Court.

3 class hours. Credit, 3.

Mr. Cahill.

66. (II) American Political Thought

A study of the development of American political thought from colonial times to the present.

3 class hours. Credit, 3.

Mr. Harris.

68. (II) International Law (1957-58)

A study of the origin, character, and function of international law. Given in alternate years.

3 class hours. Credit, 3.

Mr. Braunthal.

70. (II) International Organization (1958-59)

A study of international organization in the twentieth century, with emphasis upon the United Nations and regional organizations. Given in alternate years.

3 class hours. Credit, 3.

Mr. Braunthal.

71. (I) Ancient and Medieval Political Thought

A study of the development of political thought and its relation to cultural and institutional growth from the time of the Greeks to the end of the Middle Ages.

3 class hours. Credit, 3.

Mr. Tinder, Mr. Hampton.

72. (II) Modern Political Thought

A study of the development of political thought and its relation to cultural and institutional growth from the rise of the modern state to the present.

3 class hours. Credit, 3.

Mr. Tinder, Mr. Hampton.

73. (I) Comparative Government

An historical and functional analysis of the institutions of government in modern democracies and dictatorships.

3 class hours. Credit, 3.

Prerequisite, Government 26. Mr. Allen, Mr. Harris.

74. (II) Comparative Political Parties and Politics

An analysis of the ideology, structure and dynamics of diverse types of political parties, of electoral systems and of party systems in an effort to suggest interrelationship.

3 class hours. Credit, 3.

Prerequisites, Government 25, 26. Mr. Allen, Mr. Harris.

76. (II) Public Opinion in Politics (1958-59)

A study of opinion and communication as aspects of the political process with emphasis upon communication through mass media. Examination of the relations between mass attitudes and communication and political institutions and the formation of public policy. Given in alternate years.

3 class hours. Credit, 3.

Mr. Mainzer.

78. (II) Municipal Administration (1958-59)

A study of administrative management in American municipalities based on descriptive literature, case materials, and personal observation, with particular attention to Massachusetts cities and towns. Given in alternate years.

3 class hours. Credit, 3.

Mr. Gillespie.

80. (II) Municipal Law (1957-58)

A study of the legal problems encountered in the creation and operation of local government, with special reference to Massachusetts cities, towns, and counties. Given in alternate years.

3 class hours. Credit, 3.

Mr. Gillespie.

83. (I) Public Personnel Administration

Theory, practice, and organization of the personnel functions in governmental administration, including recruitment, testing, classification, compensation, promotions, training, and employee relations.

3 class hours. Credit, 3.

Prerequisites, Government 25, 61, or permission of instructor. Mr. Mainzer.

84. (II) Governmental Financial Administration

Theory, practice, and organization, including budgeting, revenues, debt operations, records administration, purchasing, audits, and financial reporting.

3 class hours. Credit, 3.

Prerequisites, Government 25, 61, or permission of instructor. Mr. Harris.

91. (I) Scope and Methods of Political Science

Critical examination of the scope and unity of political science and the significant methodological positions and research techniques.

3 class hours. Credit, 3.

Prerequisite, Government 25. Mr. Mainzer.

93. (I) 94. (II) Seminar

A study of special problems in the field of government.

3 class hours. Credit, 3.

The Department.

HISTORY

Professor Caldwell, Professor Cary, Associate Professor Davis, Associate Professor Zeender, Assistant Professor Pflinze, Assistant Professor Potash, Mr. Gagnon†, Mr. Dietel, Mr. Brown, Mr. Greenbaum, Mr. Woehrlin, Mr. Craig, Mr. Ilardi.

† On leave of absence.

5. (I) 6. (II) Modern European Civilization

The first semester covers the period from the later Middle Ages to 1815; the second semester, the period from 1815 to the present. These courses are required of candidates for the B.A. degree but may be elected independently by other students.

3 class hours. Credit, 3.

The Department.

25. (I) 26. (II) The Development of American Civilization

A survey of the national development including political, social, economic, and cultural factors in the growth of American democracy. The first semester covers the period to 1865; the second, from 1865 to the present. Either semester may be elected independently.

3 class hours. Credit, 3.

Mr. Cary, Mr. Davis, Mr. Brown.

31. (I) 32. (II) English History

Emphasis on economic, social, and cultural influences, as well as on constitutional development. Either semester may be elected independently.

3 class hours. Credit, 3.

Mr. Caldwell, Mr. Dietel.

51. (I) Ancient History

A general survey of Mesopotamian, Egyptian, Greek, and Roman history, with primary emphasis on cultural and intellectual achievements.

3 class hours. Credit, 3.

Mr. Davis.

53. (I) 54. (II) History of Far Eastern Civilization

A general historical introduction to the civilization and contemporary problems of the Far East. The first semester treats the traditional civilization and the early impact of the west. The second semester deals with revolutionary developments of the twentieth century and the place of the Far East in the world balance of power. Either semester may be elected independently.

3 class hours. Credit, 3.

Mr. Craig.

56. (I) History of Russia (1958-59)

A general historical introduction to the civilization and contemporary problems of Russia. Growth of the Russian state, society, culture and ideology, and their relations to the non-Russian world. Emphasis on the Soviet period. Given in alternate years.

3 class hours. Credit, 3.

Mr. Woehrlin.

57. (I) 58. (II) Hispanic-American History

The first semester deals with the colonial period: the age of the "conquistadores", political, economic, and cultural developments, and growth of the independence movement; the second semester with the period of national development from 1810 to the present. Emphasis will be given to the history of Mexico and the more important South American countries. Either semester may be elected independently.

3 class hours. Credit, 3.

Mr. Potash.

62. (II) Medieval History

Europe from the collapse of Roman civilization to the Renaissance. Fusion of the Graeco-Roman inheritance, Christianity, and Germanic traditions in the building of Western European civilization. The medieval outlooks as expressed in the thought and culture of the High Middle Ages.

3 class hours. Credit, 3.
Prerequisite, History 32. Mr. Zeender.

63. (I) 64. (II) History of American Thought and Culture

A study of the basic strands of American thought and their reflection in the development of social life and institutions, literature, and the arts. The first course covers the period to 1865. Either semester may be elected independently.

3 class hours. Credit, 3.
Mr. Brown.

66. (II) The History of Modern Germany

The evolution of Germany since 1750 in relationship to Western Europe. An analysis of those economic, social, political, and intellectual influences which determined the unique direction of German cultural development. A study of the Nazi revolution and contemporary Germany.

3 class hours. Credit, 3.
Mr. Pflanze.

69. (I) Europe, 1870-1918

Internal developments of the principal countries, including political and economic changes, social unrest, and intellectual currents; the development of imperialism; a detailed study of conditions and diplomacy which led to the World War; military history of the War.

3 class hours. Credit, 3.
Prerequisite, History 6. Mr. Zeender.

70. (II) Europe since 1918

Concentration on major aspects of the internal and international affairs of European states since World War I: Soviet communism, conflict between democracy and authoritarianism in Italy, Germany, France, and Spain, crises leading to World War II, post-war problems.

3 class hours. Credit, 3.
Mr. Caldwell.

72. (II) History of American Westward Expansion, 1763-1893

Advance of settlement from the Appalachians to the Pacific and influence of the frontier upon social, economic, and political conditions in the country as a whole.

3 class hours. Credit, 3.
Prerequisite, History 25. Mr. Davis.

73. (I) History of the Renaissance

The later Middle Ages; the Church at the height of power; the rise of nationalities; the Italian towns; the New Learning and its relation to art, science, invention, geographical discoveries; spread and effects of the Renaissance.

3 class hours. Credit, 3.
Mr. Ilardi.

74. (II) Age of Reformation

A study of the religious changes, and the accompanying political upheavals, and the social, economic, and cultural developments in 16th and 17th century Europe.

3 class hours. Credit, 3.
Mr. Dietel.

77. (I) Modern Britain

A study of selected topics on the political, social, and intellectual development of Britain in the nineteenth and twentieth centuries.

3 class hours. Credit, 3.
Mr. Caldwell.

79. (Summer) New England to 1860

A study of the colonial and early national periods, with emphasis on the political, social, and economic aspects of life in this region.

30 class periods. Credit, 3.
Mr. Cary.

81. (I) 82. (II) Diplomatic History of the United States

The development of American foreign relations, 1776 to the present. Either semester may be elected independently.

3 class hours. Credit, 2 or 3.
Prerequisites, History 25, 26, or permission of the instructor. Mr. Cary.

91. (I) Seminar

Instruction in bibliography, evaluation of source materials and preparation of reports.

1 class hour. Credit, 1.
Mr. Greenbaum.

92. (II) Historiography

Critical evaluation of representative historians from ancient to modern times.

1 class hour. Credit, 1.
Mr. Greenbaum.

HOME ECONOMICS

Professor Mitchell, Associate Professor Briggs, Associate Professor Merriam†, Associate Professor Cook, Associate Professor Davis, Assistant Professor McCullough, Assistant Professor Strattner, Assistant Professor Wilhelm†, Assistant Professor Hawes, Assistant Professor Thies, Assistant Professor Esselen, Miss Fietsam, Mrs. Boicourt, Mrs. Sullivan.

3. (I) Nutrition

The fundamental principles of nutrition and their application to individual and family food habits.

3 class hours. Credit, 3.
Miss Mitchell.

† On leave of absence.

4. (II) Textiles

An introduction to the characteristic properties and uses of natural and synthetic fibers; the conversion of fiber to finished fabrics; fabric identifications; buying and use of fabrics for clothing and home use.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Miss Hawes.

25. (I) Consumer Clothing Problems

This course consists of three fundamental approaches to clothing problems: consumer education in relation to economics in the field of ready-to-wear; a study of art and psychology applied to the selection of apparel: and basic principles of construction.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Mrs. Wilhelm, Miss Hawes.

30. (II) Food Science and Preparation

The fundamental scientific principles and comparative methods of food preparation. The nutritional and economic aspects of foods are also stressed.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Miss Davis.

31. (I) Applied Art

Art principles are studied with many practical applications for selecting and arranging. Specific problems in decorating cloth, wood, and leather afford opportunity for individual expression.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Miss Briggs.

35. (I) and (II) Clothing Construction

Advanced construction and fitting problems with emphasis on new fabrics. In the latter part of the semester provision is made for individual development in the field of clothing in which the student is interested, either in advanced construction problems or in creative pattern drafting.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Home Economics 25 or equivalent.
Mrs. Wilhelm, Miss Hawes.

41. (I) Nutrition and Food Preparation (For Nurses)

This course combines the fundamentals of nutrition with food preparation and meal planning to meet nutritional requirements. The content and emphasis is appropriate for nurses whose responsibilities will be mostly with their patients. Admission by permission of instructor.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisites, Chemistry 1 and 2; Zoology 35. Mrs. Cook.

51. (I) Meal Planning

Meal planning, serving and etiquette. Emphasis on nutritional needs; management of money, time and labor in selection, planning, preparation, utilization, and care of food. Further study of food principles and techniques of cookery and short units in food preservation, freezing, canning, and outdoor cookery.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Home Economics 30. Miss Davis.

52. (II) Nutrition and Dietetics

The fundamentals of normal nutrition including energy needs, the metabolism of proteins, carbohydrates, fats, vitamins, and minerals; and the

quantitative requirements for essential nutrients. Laboratory work provides for further study of the composition of foods and their contribution to the diet.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisites, Home Economics 3, 51; Chemistry 79; Zoology 35. Mrs. Cook.

54. (II) Nutrition

For students who are not majoring in Home Economics. This course is designed to interpret the technical knowledge of foods and nutrition in terms of its practical application for optimum health.

3 class hours. Credit, 3.
Mrs. Cook.

56. (II) Meal Planning

This course is designed to meet the needs of those who wish a general knowledge of the basic food principles. It includes latest methods and techniques of cookery, conservation of nutrients, menu planning and food preparation, buying of food, consumer education and table service, decoration and etiquette. It is recommended for students who want a scientific as well as practical knowledge of food and its preparation for everyday use.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Mrs. Esselen.

60. (II) Household Equipment

The selection, care, and operation of household equipment including application of the principles of mechanics and physics involved.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Miss Merriam.

61. (I) Demonstration Techniques

Emphasis is given to the purposes and techniques of demonstration both in preparation of food and the use of equipment, with application to teaching extension, and business.

2 2-hour laboratory periods. Credit, 2.
Miss Davis.

62. (II) Home Furnishing

The fundamental principles which underlie the successful planning and furnishing of a satisfying home. A study of period homes and furnishings is included. Many applications of these principles are worked out in practical problems.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Miss Briggs.

63. (I) Arts and Crafts

Introduction to design and execution in crafts particularly adapted to work with children in schools, playgrounds, summer camps; and for any age in recreational leadership and occupational therapy. Opportunity will be offered for work in several of the following: wood and leather work, block printing, finger-painting, etching, knotting, etc.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Miss Briggs.

70. (I) and (II) Child Development

The growth and development of the child, his basic needs, aspects of behavior-routine, creative and social—as they are related to personality development. Planned observation and participation in nursery school.

3 class hours; 1 1-hour laboratory period. Credit, 3.
Mrs. Thies.

HOME ECONOMICS

71. (I) Retail Food Buying

This course is offered jointly by the departments of horticulture, animal husbandry, and poultry husbandry and home economics for all students interested in retail marketing. Vegetables and fruits; retail buying, varieties and adaptability to various uses, season of availability, grades, packs and packages. Poultry and eggs; —dressed poultry is graded and prepared in various ways for the table and home freezing. Demonstrations are given of handling and marketing classification of eggs. Meats; —demonstration and laboratory practices in identification and classification of meat cuts, in preservation (freezing and curing) and in judging quality. Processed and packaged foods: a survey of new developments in relation to both their monetary economy and convenience to the retail food buyer.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Snyder, Mr. Vondell, Mr. Buck.
Mrs. McCullough, coordinator.

75. (I) Economics of the Household

The family standards of living in the modern home, the economic relations of the household, and the use of time, energy, and money as a means to influence the home situation.

3 class hours. Credit, 3.

Miss Merriam, Miss Fietsam.

77. (I) and (II) Home Management Practice

Successive groups of seniors live in the home management house and assume responsibilities involved in managing a home. Meals are planned on low, medium, and high income levels.

Credit, 3.

Prerequisites, Home Economics 51 or 56, and 75, or by special permission.

Miss Merriam, Miss Fietsam.

78. (II) Advanced Textile Design

Weaving and handling of complicated looms. Other types of textile design such as stenciling, silk screen printing, batik, block print, with individual problems dependent on the student's special interests.

1 class hour; 2 3-hour laboratory periods. Credit, 3.

Prerequisite, Home Economics 31 or its equivalent. Miss Briggs.

80. (II) Family Life

A study of the modern family; ideals and responsibilities of the home and the individual's share in developing positive family relationships.

3 class hours. Credit, 3.

Miss Strattner.

81. (I) Methods of Teaching Home Economics

The philosophy of general education; the application of home economics to the entire school program; development of curricula based upon student needs; exploration of instructional methods and techniques. This course gives credit toward meeting state standards for teachers.

3 class hours. Credit, 3.

Miss Strattner.

85. (I) Theory and Practice of Nursery School Management

The history and philosophy of the pre-school program; theory and techniques of nursery school practice; children's activities in music, art, literature,

and science; fundamentals of play and use of play materials, and methods of observation and recording. Supervised participation in child development laboratory as well as field trips to observe special groups.

2 class hours; 1 3-hour laboratory period. Credit, 3.

Prerequisite, Home Economics 70 or equivalent. Mrs. Thies.

87. (I) Principles and Practices of Tailoring

Emphasis on handling of wool in the making of suits and coats.

1 class hour; 1 4-hour laboratory period. Credit, 3.

Prerequisite, Home Economics 35 or equivalent.

Mrs. Wilhelm, Miss Hawes.

88. (II) Applied Dress Design

Costume design through draping and pattern making. An intensive study is made of texture, line, color and fit as applied to dress design and the figure.

3 2-hour laboratory periods. Credit, 3.

Prerequisite, Home Economics 35 or equivalent. Mrs. Wilhelm.

89. (I) Diet Therapy

The application of nutrition principles to diet in disease. Recent theories of dietary treatment of gastro-intestinal disorders, obesity, anemia, fevers, diabetes, food allergy, cardiovascular and biliary tract diseases are reviewed critically. Students are required to use and be familiar with current medical literature as it applies to nutritional problems in disease.

3 class hours. Credit, 3.

Prerequisites, Home Economics 52; Chemistry 79; Zoology 35; or equivalent.

Mrs. Cook.

90. (I) and (II) Professional Seminars

A one-credit seminar is offered in each field of subject matter: Nutrition, Textiles, Clothing, Foods, Institution Administration, Home Management and Equipment, Family Life and Child Development. One seminar is required of each senior and permission may be granted to take as many as three.

Credit, 1-3.

The Staff.

91. (I) 92. (II) Institutional Administration and Quantity Food Preparation

For students interested in institutional, industrial, and commercial food service. A study of principles of organization, personnel management, sanitation, food preparation, service and costs. Work in quantity food preparation and some special catering at a University dining hall. Field trips in the area.

2 class hours; 1 6-hour laboratory period or field work. Credit, 3.

Prerequisite, Home Economics 51 or 56. Mrs. McCullough.

93. (I) Experimental Foods

The testing and comparing of different food materials and methods of preparation, including advanced work in the science and techniques of cookery. Special individual problems will be studied.

2 class hours; 1 3-hour laboratory period. Credit, 3.

Prerequisite, Home Economics 30. Miss Davis.

HORTICULTURE

95. (I) Child Nutrition

A study of nutritional needs from prenatal life through school age. Methods of judging nutritional status, also causes and effects of malnutrition. Work in the Nursery School and with older children.

3 class hours; laboratory hours by arrangement. Credit, 3.
Prerequisite, Home Economics 3 or 52 or 54. Mrs. Cook.

98. (I) and (II) Problems in Home Economics

An intensive study of some phase of home economics. By permission of the Staff adviser.

Credit, 1-3.
The Staff.

HORTICULTURE

Professor French, Professor Snyder, Professor Boicourt, Associate Professor Roberts, Assistant Professor Ross, Assistant Professor Tuttle, Assistant Professor Jester, Mr. Anderson, Mr. Goddard, Mr. Maynard.

2. (II) Basic Horticulture

An introductory course for those interested in acquiring some basic knowledge of horticulturally important plants. It is concerned with the structure, flowering and fruiting habits, propagation, training, pruning, and storage of many of our economic plants as well as an introductory discussion of the influence of soil, nutritional status, environmental factors and growth regulating substances on their development.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Southwick, Mr. Anderson.

FLORICULTURE

26. (II) Garden Materials

A study of the annuals, biennials, herbaceous perennials, bulbs, bedding plants, and roses that are valuable for use in floricultural or landscape gardening work. Methods of propagation, culture, and uses of the various plants are considered as well as identification of materials.

2 class hours; 1 2-hour laboratory period. Credit, 3.
11:00-11:50 M. F.; 3:00-4:50 Th. Mr. Goddard.

51. (II) Greenhouse Management

This course is intended to familiarize students with the methods and principles involved in the management of greenhouses and greenhouse crops; history and development of the floricultural industry, preparation of soils, fertilizers, potting, watering, ventilation, control of insects and diseases, methods of plant propagation, forcing plants, soilless methods of plant culture. At some time during the semester the members of the class will be required to take a one-day trip to visit large commercial establishments at an approximate cost of five dollars.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 M. F.; 1:00-2:50 F. Mr. Jester.

52. (II) Floral Arrangement

A study of the principles involving the arrangement and use of cut flowers and plants; funeral designs, basket and vase arrangements, corsages, wedding bouquets, table decorations, home, church, and other interior decorations. A study of color and color harmony as applied to such work. This course is limited to ten students, preference being given to students specializing in floriculture and landscape architecture.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
8:00-8:50 Th.; 1:00-2:50 M. F. Mr. Jester, Mr. Ross.

54. (II) Greenhouse Construction and Heating

The location, types, arrangements, construction, cost, equipment, heating, and ventilation of greenhouse structures; the drawings of plans and study of specifications. Special emphasis laid on heating problems.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 M. F.; 3:00-4:50 M. Mr. Goddard.

58. (II) Amateur Floriculture

This course is intended primarily for major students in the School of Home Economics and for other women students. Three phases of floriculture will be considered: (1) the arrangement and use of cut flowers for decorative purposes in the home and elsewhere, (2) house plants, methods of propagation, (3) garden flowers and their uses on the home grounds.

2 class hours; 1 2-hour laboratory period. Credit, 3.
10:00-10:50 Tu. Th.; 3:00-4:50 Tu. or 1:00-2:50 Th. Mr. Ross, Mr. Goddard.

75. (I) 76. (II) Commercial Floriculture

A detailed study of the cultural methods for the important commercial cut-flower crops and potted plants. The marketing of flowers and plants, including the management of wholesale markets and retail stores, a study of systems of record keeping, cost analysis, inventory methods, and other phases of this important part of the floricultural industry. Trips may be taken to nearby commercial establishments.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 Tu. Th.; 1:00-2:50 Tu. Mr. Jester.
Prerequisite, Floriculture 51.

79. (I) Conservatory Plants (1958-59)

Alternates with Course 81 for students specializing in floriculture. A study of the foliage and flowering plants used in conservatory work; methods of propagation; identification of materials.

1 class hour; 1 2-hour laboratory period. Credit, 2.
12:00-12:50 Th.; 1:00-2:50 M. Mr. Ross.

81. (I) Herbaceous Gardens and Borders

Alternates with Course 79 for students specializing in floriculture; given annually for students specializing in landscape architecture. This course is a continuation of Course 26 with emphasis on the use of herbaceous materials in various types of planting of borders and gardens.

1 class hour; 1 4-hour laboratory period. Credit, 3.
10:00-10:50 Tu.; 1:00-4:50 Th. Mr. Boicourt, Mr. Goddard.
Prerequisite, Floriculture 26.

OLERICULTURE

82. (II) Seminar and Special Problems

For seniors specializing in floriculture. Presentation and discussion of research work in floriculture and other related fields and individual problems.

1 class hour; 4 laboratory hours. Credit, 3.

11:00-11:50 W.; laboratory hours by arrangement. THE DEPARTMENT.

OLERICULTURE

25. (I) Basic Olericulture

A detailed study of the relationship of water, temperature, humidity, light and other basic factors of the environment to the culture of vegetables and other closely related horticultural crops.

2 class hours; 1 2-hour laboratory period. Credit, 3.

MR. MAYNARD.

51. (I) Nutrition of Vegetable Crops

A critical study of the nutrient requirements of vegetable plants involving soils and their preparation, manures, fertilizers, lime, green manures and crop residues as they relate to intensive cultural practices.

3 class hours. Credit, 3.

MR. TUTTLE.

52. (II) Commercial Vegetable Production

This course deals with the commercial production of the more important vegetable crops grown out-of-doors and under glass, including the principles basic to vegetable farm organization and management, plant growing, varieties, soil management, cultivation, weed control, irrigation, and other special cultural practices. Trips to nearby farms will be required.

2 class hours; 1 2-hour laboratory period. Credit, 3.

MR. THOMSON, MR. MAYNARD.

73. (I) Produce Marketing Practices

Consideration will be given to the various techniques and methods of preparing produce for market, including harvesting; post harvest handling—washing, waxing, precooling; the use of various gases and growth regulators; packing house facilities and short time storage requirements. Major attention will be given to commercial grades, packs and packages and the various types of produce inspection services.

3 class hours. Credit, 3.

10:00-10:50 M. W. F. MR. SNYDER.

74. (II) Merchandising of Perishables

Discussions will include the various techniques, practices and methods used in merchandising horticultural commodities through both wholesale and retail channels. Major emphasis is placed on prepackaging, promotion and advertising, brands and their use, federal and state regulations, wholesale outlets and operators, methods of sale, retail outlets and selling, roadside and farm markets and transportation.

3 class hours. Credit, 3.

10:00-10:50 M. W. F. MR. SNYDER.

75. (I) Systematic Olericulture (1959-60)

A detailed study of vegetable crops as to their history, nomenclature, classification, structure and identification. Given in alternate years.

2 class hours; 4 laboratory hours: Credit, 4.

Hours by arrangement. MR. SNYDER.

80. (II) Special Problems

An advanced study of specific problems relative to the production and marketing of vegetable crops, including a review of basic research reports and current literature.

1 class hour; 4 laboratory hours. Credit, 3.
Hours by arrangement. The Department.

POMOLOGY

25. (I) Introductory Pomology

This course deals with modern tree fruit production including varieties, orchard sites and soils, planting systems, soil management, fertilizers, bearing habits, pruning, pollination, thinning, pest control and handling the crop. The content of this course should be of value to students majoring in allied fields.

2 class hours; 1 2-hour laboratory period. Credit, 3.
10:00-10:50 M. F.; 3:00-4:50 W. Mr. Anderson.

26. (II) Small Fruits

A study of the growing of raspberries, blackberries, strawberries, currants, blueberries, cranberries, and grapes, dealing with such questions as varieties, selecting a site for the plantation, soils, fertilizers, pruning, harvesting, and marketing.

2 class hours; 1 2-hour laboratory period. Credit, 3.
10:00-10:50 M. F.; 1:00-2:50 W. Mr Anderson.

56. (II) Orchard Pest Control

This course is especially designed to familiarize the student with: (a) spraying and dusting machinery; (b) methods in the application of materials used in orchards, with the important considerations for spraying each fruit and for combating each orchard pest; (c) preparation for use of the common fungicides and insecticides.

2 class hours; 1 2-hour laboratory period. Credit, 3.
8:00-8:50 Tu. Th.; 1:00-2:50 Tu. Mr. Roberts.

75. (I) Systematic Pomology (1958-59)

A study of the more important kinds and varieties of fruits grown in the United States, their relationships and nomenclature. Particular emphasis is placed upon the idenification, classification and value of varieties including a study of the characters of the plant as well as the fruit. Given in alternate years.

1 class hour; 3 2-hour laboratory periods. Credit, 4.
8:00-8:50 Tu.; 1:00-2:50 M. W. F. Mr. Anderson.

77. (I) Fruit Marketing (1959-60)

This course consists of a critical study of the handling of fruit from tree to consumer, including such phases as the physiology of fruit as related to harvesting procedure, also fruit grades and grading, packing, storing and merchandising. Given in alternate years.

2 class hours; 1 2-hour laboratory period. Credit, 3.
8:00-8:50 W. F.; 2:00-3:50 F. Mr. Roberts.

79. (I) Advanced Pomology (1958-59)

Special attention is given to more important findings of research dealing with the interrelation of stock and scion, temperature influences, water relationships and the mineral nutrition of fruit plants. The geography of world fruit production is also considered. Given in alternate years.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Pomology 25 or equivalent. The Department.

81. (I) Advanced Pomology (1959-60)

A critical study of the more important research dealing with pollination, fruit set and thinning, preharvest drop, biennial bearing, and the physiology of fruit during storage. The location and objectives of fruit breeding programs in the United States are also discussed. Given in alternate years.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Pomology 25 or equivalent. The Department.

84. (II) Special Problems in Pomology

Each student will investigate an individual problem pertinent to his future objectives.

1 class hour; 4 laboratory hours. Credit, 3.
Prerequisites, Pomology 79 and 81. The Department.

85. (I) 86. (II) Cranberry Problems

For seniors specializing in cranberry technology. Selected readings and individual work to familiarize students with the literature, research, and problems of the cranberry industry.

Hours by arrangement. Credit, 2.
Mr. French.

PLANT BREEDING

52. (II) Plant Breeding Methods

An advanced study of genetic topics peculiar to plants, also the methods and problems of the plant breeder. Laboratory work in genetic analysis and the breeding of plants.

2 class hours; 1 2-hour laboratory period. Credit, 3.
11:00-11:50 M. F.; 3:00-4:50 W. Mr. French.
Prerequisite, Zoology 53.

81. (I) 82. (II) Special Problems in Plant Breeding

Qualified seniors may carry on advanced study on special topics or undertake such original investigation as time and available material will permit.

Hours by arrangement. Credit, 2.
Prerequisite, Plant Breeding 52. Mr. French.

HYGIENE

Hygiene

All freshmen are required to attend a series of lectures on personal hygiene. For men students these lectures are included in the Military program; for women students they are scheduled as a separate course.

Credit, 1.
The Health Service Staff.

JOURNALISM

PROFESSOR MUSGRAVE.

75. (I) News Communication

A study of news writing and editing for the press, radio, and television. Stress is placed upon writing techniques for the efficient transmission of information, and upon concepts which seek to explain the communication process.

3 class hours. Credit, 3.

MR. SAVAGE.

83. (I) Community Journalism

A study of the weekly newspaper, the small-city daily, and the scholastic press, combined with training in copy editing. The University student publications and town newspapers are used as laboratories.

2 class hours; 1 laboratory period. Credit, 3.

MR. MUSGRAVE.

85. (I) Introduction to Mass Communication

Designed to acquaint the student with the scope, principles, and practice of contemporary journalism. Stress is placed upon the role of the press as a social institution and upon the relationships between a general education and effective journalism.

3 class hours. Credit, 3.

MR. MUSGRAVE.

86. (II) Feature Article Writing

Instruction in writing feature or magazine articles, combined with a study of the field of magazine journalism. The practice work is related to problems of interpretive writing and communication. Each student is expected to publish a feature article in a newspaper, a trade journal or other magazines.

3 class hours. Credit, 3.

MR. MUSGRAVE.

88. (II) Problems in Journalism

The readings cover selected areas of journalistic studies, such as civil rights and the press, language and communication, comparative foreign journalism, history of journalism, communication research methods, the criticism of mass media. Laboratory work for seniors is arranged on daily newspapers. Admission by permission of instructor.

2 class hours: 1 laboratory period. Credit, 3.

MR. MUSGRAVE.

90. (II) Language and Mass Communication

A study of major approaches to language problems from the viewpoint of their relevance to the mass communication media and to increased communication skill by students. Stress is placed upon interpreting the literature of empirical data and experimental research in this area of language studies.

3 class hours. Credit, 3.

MR. MUSGRAVE.

LANDSCAPE ARCHITECTURE

Professor Otto, Professor Blundell, Assistant Professor Procopio, Assistant Professor Hamilton, Mr. MacIver, Visiting Lecturer Bacon, Visiting Lecturer Kantianis.

LANDSCAPE ARCHITECTURE

23. (I) History and Literature of Landscape Architecture

The history and literature of landscape architecture and allied fields, including the application in design of forms, motifs, and composition drawn from nature.

3 class hours. Credit, 3.
Mr. Otto.

25. (I) Freehand Drawing and Elementary Design

The work in this course is to supply the student with technical aspects of freehand drawing and design necessary to proficiency in that field.

3 2-hour laboratory periods. Credit, 3.
Mr. MacIver.

26. (II) Landscape Drafting

This course continues the work in Landscape Architecture 25, but draws on the mechanical aspects of the designers problems and includes simple projections—orthographic, perspective, and isometric—and architectural shades and shadows.

3 2-hour laboratory periods. Credit, 3.
Mr. Procopio.

30. (II) Plant Materials

Detailed study of deciduous and evergreen trees, with special reference to their mature form and character, means of identification, natural associations, and uses of the various types of trees in landscape work.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Blundell.

51. (I) Elements of Topography and Construction

Contour interpolation, grading and drainage, plans, drive design, profiles and sections, computation of earth work. Application of surveying to landscape construction.

3 2-hour laboratory periods. Credit, 3.
Prerequisites, Civil Engineering 27; Landscape Architecture 26.
Mr. Hamilton.

52. (II) Construction Details

A series of problems in architectural garden features as walks, steps, walls, gates, pools, and small structures.

3 2-hour laboratory periods. Credit, 3.
Prerequisite, Landscape Architecture 51. Mr. Hamilton.

53. (I) Introductory Design

Fundamental principles of composition with application to problems in the design of gardens and small home grounds.

3 2-hour laboratory periods. Credit, 3.
1:00-2:50 M. W. F. Mr. Otto.
Prerequisites, Landscape Architecture 25 and 26, or permission of the instructor.

54. (II) General Design

A series of problems in the design of private properties and public works. Members of this class will be required to take a two-day field trip to visit typical examples of design; approximate cost, $15.00.

3 2-hour laboratory periods. Credit, 3.
1:00-2:50 M. W. F. Mr. Otto.
Prerequisites, Landscape Architecture 51, 53, and concurrently 52.

59. (I) Plant Materials

Detailed study of shrubs and woody vines, and their identification, with special emphasis being given to their adaptability to the various landscape uses, methods of handling, and care.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Blundell.

60. (II) Planting Design

A study of the utilization of plant materials in combination as applied to the many conditions and demands of landscape work.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisites, Landscape Architecture 30, 59. Mr. Blundell.

79. (I) Construction and Maintenance (1959-60)

A study of construction methods and materials as applied to the landscape field. Given in alternate years.

3 class hours. Credit, 3.
10:00-10:50 M. W. F. Mr. Procopio.

81. (I) 82. (II) Advanced Design

Class B Exchange Problems plus specialized study of landscape details and a summary of general design. Members of the class may be required to take a two-day field trip to visit typical examples of design; approximate cost, $15.00.

3 2-hour laboratory periods. Credit, 3.
Prerequisites, Landscape Architecture 53 and 54. Mr. Procopio.

83. (I) Architecture (1958-59)

The history of architectural development, including styles of architecture and construction principles of value to landscape architects when working with architectural problems. Given in alternate years.

3 class hours. Credit, 3.
Mr. Gardner.

84. (II) Sketching

Drawing and sketching in various mediums from outdoor and indoor subjects.

2 2-hour laboratory periods. Credit, 2.
Mr. MacIver.

85. (I) 86. (II) City Planning

A study of the historical and legal aspects of rural and urban land use and regional development, and a critical examination of planning techniques used in guiding the physical growth and arrangement of communities. Either semester may be elected independently.

3 class hours. Credit, 3.
Mr. Bacon.

87. (I) Projects in Planning

An application of the principles of modern civic art through a series of problems on the design of various types of urban land areas.

3 2-hour laboratory periods. Credit, 3.
Prerequisite, Landscape Architecture 86. Mr. Bacon.

88. (II) Projects in Planning

A continuation of Landscape Architecture 87.

2 3-hour laboratory periods. Credit, 3.
Mr. Bacon.

MATHEMATICS

Professor Andersen, Professor Wagner, Associate Professor Boutelle, Associate Professor Rose, Associate Professor Cullen, Assistant Professor Moser, Assistant Professor Dickinson, Mr. Skillings, Mr. Allen, Mr. Bussel, Mr. Naylor, Mrs. Rice, Miss Cook, Miss Navratil, Mr. Thomas, Mr. Trahan, Mr. Durfee, Mr. Libera, Mrs. Stockton, Mr. Pavelcak, Mr. Azpeitia.

01. (I) Elementary College Algebra

A course intended for those students who offer only one unit of algebra for entrance. It contains a review of elementary algebra and a more thorough study of such topics as quadratic equations, exponents and radicals, and progressions. No college credit is given for this course, but the successful completion of this course and Mathematics 14 which follows in the second semester, may satisfy the freshman mathematics requirement unless the student's major requires further mathematics.

3 class hours. Credit, 0.
The Department.

1. (I) Introductory Mathematics I

Basic set-theoretic and axiomatic concepts, number systems and equations. A study of elementary functions, algebraically and by the methods of analytic geometry.

3 class hours. Credit, 3.
The Department.

2. (II) Introductory Mathematics II

A terminal course intended for students whose curriculum calls for just one year of mathematics. A continuation of Mathematics 1, including topics from the calculus, statistics, and mathematics of finance.

3 class hours. Credit, 3.
Prerequisite, Mathematics 1. The Department.

4. (II) Introductory Mathematics IV

A continuation of Mathematics 1 for those students intending to take further courses in mathematics. Analytic geometry and trigonometry.

3 class hours. Credit, 3.
Prerequisite, Mathematics 1. The Department.

5. (I) Introductory Engineering Mathematics

Trigonometry and algebra: a rapid basic review, theory of equations, simple determinants and the slide rule. Plane analytic geometry: the straight line, conic sections, selected higher plane curves, polar coordinates and parametric equations.

4 class hours. Credit, 4.
THE DEPARTMENT.

6. (II) Introductory Calculus for Engineering

Differentiation, with applications, techniques of integration.

4 class hours. Credit, 4.
Prerequisite, Mathematics 5. THE DEPARTMENT.

7. (I) Algebra and Trigonometry

For freshmen, except majors in Engineering, who are required to take a full year of college mathematics. Fractions, quadratic equations, exponents, logarithms, variation, determinants of the second and third orders, and plane trigonometry.

3 class hours. Credit, 3.
THE DEPARTMENT.

8. (II) Algebra

This course is designed for freshmen who do not plan to proceed to Calculus. Theory of equations, progressions, mensuration, number systems, and the elements of statistics and mathematics of investments.

3 class hours. Credit, 3.
THE DEPARTMENT.

10. (II) Algebra and Analytic Geometry

This course is designed for freshmen who plan to take Calculus. Theory of equations, binominal theorem, determinants of higher order, and plane analytic geometry.

3 class hours. Credit, 3.
Prerequisite, Mathematics 7. THE DEPARTMENT.

12. (II) Functional Mathematics

For freshmen who are not required to take a full year of college mathematics. Fractions, percentage, linear and quadratic equations with applications, exponents, logarithms, slide rule, proportion, graphs, statistics, progressions, and the elements of mathematics of investments.

3 class hours. Credit, 3.
THE DEPARTMENT.

14. (II) Trigonometry and Algebra

A study of the essential elements of elementary trigonometry and selected topics in algebra.

3 class hours. Credit, 3.
Prerequisite, Mathematics 01. THE DEPARTMENT.

29. (I) Differential Calculus

The basic ideas and methods of the differential calculus.

3 class hours. Credit, 3.
Prerequisite, Mathematics 4 or 10. THE DEPARTMENT.

30. (II) Integral Calculus

A continuation of Mathematics 29 into the field of the integral calculus, with special emphasis on application to problems.

3 class hours. Credit, 3.
Prerequisite, Mathematics 29. THE DEPARTMENT.

31. (I) Applied Calculus for Engineers

Area, volume, length of curve, centroid, moment of inertia, liquid pressure, work, partial differentiation.

4 class hours. Credit, 4.
Prerequisite, Mathematics 6. THE DEPARTMENT.

32. (II) Applied Calculus for Engineers

Multiple integrals, infinite series, expansion of functions, hyperbolic functions, differential equations.

4 class hours. Credit, 4.
Prerequisite, Mathematics 31. THE DEPARTMENT.

51. (I) Modern Geometry

Axiomatic foundations of euclidean and noneuclidean geometries; extension of high-school geometry.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30. MR. ROSE.

53. (I) 54. (II) Higher Algebra

Permutations, combinations, probability; mathematical induction, matrices, determinants, linear equations and dependence; quadratic forms and elimination theory; the complex number system; polynomial equations; elementary theory of groups, rings and fields.

3 class hours. Credit, 3.
Prerequisite, Mathematics 4 or 10. MR. MOSER, MR. WAGNER.

55. (I) Mathematics of Finance

The mathematical principles of simple and compound interest, annuities, depreciation, valuation of bonds, insurance. The development and applications of aids to computation in problems arising from financial transactions.

3 class hours. Credit, 3.
Prerequisite, Mathematics 1 or 7. MR. BOUTELLE.

56. (II) Finite Differences and Probability (1958-59)

Given in alternate years.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30. MR. WAGNER.

60. (II) Spherical Trigonometry and Solid Analytic Geometry (1957-58)

The trigonometry of the sphere with application to terrestrial and celestial problems. This is followed by a study of higher plane curves and the analytic representation of points, lines, and surfaces in space. Given in alternate years.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30. MR. BOUTELLE.

63. (I) Statistics

The fundamental mathematical principles of statistical analysis. The derivation of the basic formulas used, and the study and discussion of such topics as averages, dispersion, skewness, curve fitting, least squares, linear and curvilinear correlation, probability and its application to statistics.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30, previously or concurrently. Mr. Wagner.

64. (II) Statistics

A continuation of Mathematics 63, including a study of the joint distribution of two or more random variables; the chi-squared, t-, and F-distributions and their applications; and techniques which do not involve an assumption about the form of the basic distribution.

3 class hours. Credit, 3.
Prerequisites, Mathematics 63, 91. Mr. Wagner.

66. (II) Introduction to Higher Geometry (1957-58)

A study of various methods employed in the modern treatment of the geometry of points, lines, and conics. Such topics as homogenous point and line coordinates, infinite elements; harmonic division; groups of transformations and their invariants; and the elements of projective and other geometrics, will be considered. Given in alternate years.

3 class hours. Credit, 3.
Prerequisite, Mathematics 4 or 10. Mr. Andersen.

71. (I) Vector Analysis (1959-60)

The algebra and calculus of vectors. Applications to physics and other fields will be considered. Given in alternate years.

3 class hours. Credit, 3.
Prerequisites, Mathematics 30; Physics 26. Mr. Azpeitia, Mr. Andersen.

72. (II) History of Mathematics (1958-59)

A study of mathematics as it has developed historically. Topics considered include classical problems and concepts of mathematics and the lives and times of the great mathematicians. Given in alternate years.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30. Mr. Rose.

74. (II) Theory of Numbers (1957-58)

Euclid's Algorism, Theory of Prime Numbers, Aliquot parts, congruences, further topics in number theory. Given in alternate years.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30.

81. (I) Differential Geometry (1959-60)

Theory of the geometry of curves and surfaces in three dimensions. Given in alternate years.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30. Mr. Dickinson.

83. (I) Computational Methods (1958-59)

Errors and approximations in computation, methods of approximating roots of equations, approximation of functions, empirical curve, fitting, approximate integration, and numerical integration of ordinary differential equations. Given in alternate years.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30.

91. (I) Intermediate Calculus

Series, expansion of functions, partial differentation, envelopes, and multiple integrals.

3 class hours. Credit, 3.
Prerequisite, Mathematics 30. Mr. Allen, Mr. Rose, Mr. Skillings.

92. (II) Differential Equations

3 class hours. Credit, 3.
Prerequisite, Mathematics 30. Mr. Allen, Mr. Rose, Mr. Skillings.

93. (I) Advanced Calculus

The real number system, sequences, elementary theory of functions of one variable and of several variables, Riemannian integration, line integrals, Green's theorem.

3 class hours. Credit, 3.
Prerequisite, Mathematics 91. Mr. Moser.

94. (II) Advanced Calculus

Double and triple integrals, improper integrals, gamma functions, Beta functions, elliptic functions, calculus of variations, Fourier Series, Laplace Transforms.

3 class hours. Credit, 3.
Prerequisite, Mathematics 93. Mr. Moser.

95. (I) 96. (II) Readings

A reading course in advanced theoretical topics, intended to furnish a student further preparation for graduate work in mathematics. Topics may be chosen from the fields of algebra, analysis, geometry or applied mathematics. Admission by permission of the head of the department.

3 class hours. Credit, 3.
The Department.

MILITARY SCIENCE AND TACTICS

Colonel Weaver, PMST, Lieutenant Colonel Brown, Assistant PMST, Major Wilson, Assistant PMST, Captain Wilcox, Assistant PMST, Captain Davis, Assistant PMST, Captain Francis, Assistant PMST.

1. (I) 2. (II)

Theoretical and practical instruction in organization of the Army and ROTC; individual weapons and marksmanship; American military history; and leadership, drill, and the exercise of command.

4 scheduled hours. Credit, 1.
Army Instructors.

25. (I) 26. (II)

Theoretical and practical instruction in basic tactics; map and aerial photograph reading; crew-served weapons and gunnery; radio communications; and leadership, drill, and the exercise of command.

4 scheduled hours. Credit, 1.

ARMY INSTRUCTORS.

51. (I) 52. (II)

Theoretical and practical instruction in command and leadership of small units; military teaching methods; first aid; rifle marksmanship; history and organization of Armor; tactics and troopleading; radio communications; automotive maintenance and tank driving; tank gunnery; and leadership, drill, and the exercise of command.

6 scheduled hours. Credit, 3.

ARMY INSTRUCTORS.

75. (I) 76. (II)

Theoretical and practical instruction in military administration; military law and boards; command and staff operations; estimates; combat intelligence; the military team; training management; supply and evacuation; troop movements; motor transportation; employment of armor; review of tank gunnery, automotive maintenance and radio communications; service orientation; officer indoctrination; and leadership, drill and the exercise of command.

6 scheduled hours. Credit, 3.

ARMY INSTRUCTORS.

AIR SCIENCE

COLONEL WHITE, PAS, MAJOR RICKARD, ASSISTANT PAS, MAJOR COEN, ASSISTANT PAS, CAPTAIN BENTON, ASSISTANT PAS, CAPTAIN JOYCE, ASSISTANT PAS, CAPTAIN BRIDGES, ASSISTANT PAS, CAPTAIN KAVANAGH, ASSISTANT PAS.

1. (I) 2. (II)

Theoretical and practical instruction in leadership, drill, and exercise of command, history and development of aviation, fundamentals of global geography, international tensions and security organizations, and instruments of national military security.

4 scheduled hours. Credit, 1.

AIR FORCE INSTRUCTORS.

25. (I) 26. (II)

Theoretical and practical instruction in leadership, drill and exercise of command, careers in the United States Air Force, and elements of aerial warfare, consisting of a study of targets, weapons, aircraft, the air, ocean, bases, and forces.

4 scheduled hours. Credit, 1.

AIR FORCE INSTRUCTORS.

51. (I) 52. (II)

Theoretical and practical instruction in leadership, drill and exercise of command, the air force commander and his staff, problem solving techniques, the communication process and air force correspondence, military law, courts and boards, air force base functions, and applied air science, consisting of a study of aircraft engineering, navigation, and weather.

6 scheduled hours. Credit, 3.

AIR FORCE INSTRUCTORS.

75. (I) 76. (II)

Theoretical and practical instruction in leadership, drill and exercise of command, military aspects of world political geography, military aviation, and the evolution of warfare, and leadership and management. Emphasis will be placed on preparation for commissioned service, and career guidance.

6 scheduled hours. Credit, 3.

AIR FORCE INSTRUCTORS.

MUSIC

PROFESSOR ALVIANI, PROFESSOR KING, ASSISTANT PROFESSOR CONTINO.

Applied Music

Private lessons in voice, piano, and other instruments at an approximate cost of $30.00 per semester.

15 50-minute periods each semester. No credit.

25. (I) 26. (II) Fundamentals of Music

A study of the structure of music to meet the practical needs of the listener, performer, or creator. Sight singing, ear training, and keyboard practice are used to give context to the acquired music theory. All music majors are required to study piano while following this course. Admission by permission of instructor.

1 class hour; 2 2-hour laboratory periods. Credit, 3.

1:00-3:50 Tu.; 1:00-2:50 Th. MR. CONTINO.

27. (I) 28. (II) Vocal or Instrumental Music

This course is designed to improve the playing of instruments and/or the use of the singing voice, and to create further appreciation of music by actual performance. Students electing this course should take both Courses 27 and 28. Admission by permission of the instructor.

1 class hour. Credit, 1.

Hour by arrangement.

29. (I) 30. (II) Vocal or Instrumental Music

A continuation of Music 27 and 28. Solo performance and program planning. Students taking Course 29 should also take Course 30.

1 class hour. Credit, 1.

Hour by arrangement. THE DEPARTMENT.

51. (I) and (II) Discovering Music

This elementary course is non-technical and is designed primarily for students desiring a general background and knowledge of this art. With learning to listen as its motive, the course deals with the elements of music, forms in music, music compositions and composers. Excerpts from works most frequently heard and performed will be used as illustrations.

3 class hours. Credit, 3.

MR. ALVIANI.

52. (II) Discovering Music

A continuation of Music 51. Students may register for this course without Music 51 if permission is granted by the instructor.

3 class hours. Credit, 3.

MR. ALVIANI.

55. (I) Organization and Direction of Choral Groups

The aim of this course is to demonstrate the methods of developing school and community choral groups. Techniques and factors of good vocal performance are studied and practiced. The student may conduct choral groups during the semester. Previous musical experience is desirable. Admission by permission of the instructor.

2 class hours. Credit, 2.
Hours by arrangement. THE DEPARTMENT.

56. (II) Organization and Direction of Instrumental Groups

Different types of instrumental music, the problems of balancing instrumentation, the functioning of instruments are introduced by the members of the class. Previous musical experience is desirable. Admission by permission of the instructor.

2 class hours. Credit, 2.
Hours by arrangement. THE DEPARTMENT.

61. (I) Masterpieces of Music

Selected masterpieces from musical literature are intensively analyzed, and a relationship is drawn between the compositions and the social-cultural periods in the history of music.

3 class hours. Credit, 3.
9:00-9:50 Tu. Th. S.
Prerequisite, Music 51 or 52 recommended but not required.

62. (I) and (II) Music in the Elementary Grades

Designed for the classroom teacher having little or no formal training in music, this course deals with the principles of musical development with particular emphasis on classroom presentation. Using the class as a laboratory, rote and reading songs are examined and processes of presentation evaluated.

3 class hours. Credit, 3.
MR. CONTINO.

75. (I) 76. (II) Music Theory

The development of skill in the use of music fundamentals. Elementary and advanced harmony are studied and practiced. Techniques of elementary counterpoint are presented to show their relationship to vocal and instrumental music.

2 class hours; 1 2-hour laboratory period. Credit, 3.
10:00-10:50 Tu. Th.; 2:00-3:50 W. MR. ALVIANI.

77. (I) 78. (II) Form and Analysis

An approach to the study of music through observation of its forms, analysis of its rhythms, melodies, and harmonies as used in the vocal and instrumental compositions of various periods in the historical development of music. The theory of conducting is discussed, studied, evaluated, and its techniques practiced.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
10:00-10:50 F.; 10:00-11:50 M. W. MR. KING.

79. (I) Score Reading and Analysis

Through listening and reading assignments the characteristics of voices and instruments are studied and the results are applied to practical arranging for vocal and instrumental groups of various types, sizes, and combinations.

3 class hours. Credit, 3.
MR. KING.

80. (II) Score Reading and Composition

A continuation of Music 79. In this course the student is expected to study the methods and materials of original composition. Procedures for processing, printing, publishing, and marketing are examined. Laws and regulations governing performance, publication, personnel, and other related activities are discussed.

3 class hours. Credit, 3.
Mr. King.

81. (I) Music and History

A comprehensive study of the periods in music history—Renaissance, Baroque, Classic, Romantic, and Modern—so that the student may feel their quality, understand their enthusiasm, recognize their resources and limitations, and identify their habits of thought and style.

3 class hours. Credit, 3.
Prerequisite, Music 51 or 52. Mr. King.

82. (II) Music and Research Methods

Recommended to students interested in bibliography, references, source materials, rental libraries, etc., who expect to work in the field of music or related fields. In addition to compilation, the student will investigate a special area of study and report the findings in written form.

3 class hours. Credit, 3.
Mr. King.

NURSING

Professor Maher, Associate Professor Gilmore, Associate Professor Macdonald, Assistant Professor Kelly, Assistant Professor DiMaggio, Miss Clarke.

1. (I) Introduction to Nursing

This course is designed to assist the student in her personal adjustment to the basic collegiate nursing program.

1 class hour, 16 weeks. Credit, 1.
Miss Kelly.

2. (II) Fundamentals of Nursing I

A basic course planned to familiarize the student with the major health needs of the nation, and to the community organizations designed to help individuals and families to meet these problems.

1 class hour, 16 weeks. Credit, 1.
Miss Maher, Miss Kelly.

25. (I) Fundamentals of Nursing II

This course is designed to familiarize the student with the privileges and responsibilities inherent in nursing as a profession.

1 class hour, 16 weeks. Credit, 1.
Miss Macdonald.

26. (II) Fundamentals of Nursing Care

A foundation course planned to familiarize the student with the basic principles of nursing care. Clinical experiences will include nursing practice in selected community agencies.

3 class hours; 1 4-hour clinical nursing laboratory period, 16 weeks. Credit, 4.
Miss Gilmore and Assistants.

51. (I) Medical and Surgical Nursing I

A course planned to help the student develop the ability to give nursing care to adult patients with representative health problems cared for in the medical and surgical nursing units. Emphasis is placed on the preventive, therapeutic and rehabilitative aspects of medical and surgical nursing care. Pharmacology, diet therapy, pathology and special therapies are combined within this course in relation to the health problems considered. The special services and the personnel within the hospital and community agencies are utilized to enrich the student's concept of comprehensive patient care. Experience in the medical and surgical units, out-patient service, operating room and diet service is provided.

10 class hours; 14 hours clinical nursing laboratory, 18 weeks. Credit, 16. Prerequisite, Nursing 27.

Miss Gilmore and Assistants; Medical and Allied Professional Staffs of the Springfield Hospital and Health Agencies.

60. (II) Medical and Surgical Nursing II

This course, a continuation of Medical and Surgical Nursing 51, provides the student with an opportunity to give nursing care to patients with special health problems requiring greater knowledge and skill. The student takes a more active part in planning nursing care and in individual and group teaching of patients. Clinical practice is provided in special medical and surgical services.

10 class hours; 14 hours clinical nursing laboratory, 18 weeks. Credit, 16. Prerequisites, Nursing 51, 54.

Miss Gilmore and Assistants; Medical and Allied Professional Staffs of the Springfield Hospital and Health Agencies.

52A, 57, 52B. Maternal and Child Health Nursing

Unit I—52A—Nursing of Children I.

The course is designed to give the students an increased understanding of the continuing influence of the family on the growing child and the influence of the developing child on his parents and siblings. Through observation and participation in the care of children (2-12 years of age), case studies, and group discussion, the student gains an appreciation of variations in normal growth and development and parent-child relationships.

Vassar Summer Institute for Family and Community Living (Child Study 290S), Poughkeepsie, N. Y.

4 weeks. Credit, 4.

Professor Staff of the Vassar Summer Institute.

Unit II—57—Maternity Nursing.

The course is developed around the meaning of pregnancy to the patient and the family. Special emphasis is placed upon the understanding of the mother's physiological and psychological needs before, during, and after the birth of the infant as a basis for providing nursing care, and the specialized abilities required to provide qualitative care to the mother and newborn infant.

10 class hours; 14 hours clinical nursing laboratory, 11 weeks. Credit, 10.

Miss DiMaggio; Obstetrical, Pediatric, and Allied Professional Staffs of the Wesson Maternity Hospital.

Unit III—52B—Nursing of Children II.

The course introduces the student to the health needs of children by means of a developmental approach. Emphasis is placed on the importance of child-parent-nurse relationships in the care of the child in health and illness. By

studying the needs of children at various stages of development and identifying the needs of the individual child, the student is helped to appreciate her role in helping the child and family to meet the emotional, physical, social and spiritual needs of the hospitalized child. In the pediatric in-patient and out-patient departments the student is provided with an opportunity to assist in the medical and nursing care given to children. Experience with other community agencies aids in increasing the student's understanding of the community resources which share the responsibility of providing health services for children.

10 class hours; 14 hours clinical nursing laboratory, 11 weeks. Credit, 10.

Miss DiMaggio and Professional Staffs of the Springfield Hospital and Health Agencies.

56. (II) Tuberculosis Nursing

The principles and practice of nursing the patient with tuberculosis will be utilized as a basis for extending the student's knowledge of tuberculosis; its significance as a major health problem, the special needs of patients with long-term illnesses and the epidemological aspects of communicable diseases. Clinical experience in the care of selected patients with tuberculosis will be combined with clinics, conferences, and group discussion.

Boston University School of Nursing, Boston, Mass., 6 weeks. Credit, 3.
Prerequisite, Nursing 51.

Mrs. Bess Ellison, Lecturer in Tuberculosis Nursing; Medical and Allied Professional Staffs of the Veterans Administration Hospital, Rutland Heights, and Health Agencies.

54. (II) Psychiatric Nursing

Through the presentation and discussion of the dynamics of human behavior, the content of the course is extended to include the fundamentals of psychopathology related to the basic origin of conflict. The specialized abilities and skills of the nurse in providing care to the mentally ill patients are presented in order that the understanding of the patient's behavior will lead to a constructive nurse-patient relationship thereby enabling the students to participate more fully in the therapeutic plan. The relationship of selected patient's behavior pathology to early manifestations of behavior deviation, early diagnosis, treatment, rehabilitation and prevention will be discussed in case conferences. Community responsibility, resources and planning in regard to this major health problem will be explored. Experience in the care of selected patients in a psychiatric hospital is provided.

10 class hours; 14 hours clinical nursing laboratory,
12 weeks. Third year. Credit, 10.
Prerequisite, Nursing 51.

Miss Kelly; Psychiatric and Allied Professional Staffs of the Cooperating Hospitals and Agencies.

58. Introduction to Public Health

Unit I—58A—Public Health Administration.

The course is developed to familiarize the student with the philosophy, scope and purpose of public health; and the relationship of the organizational structure of national, state, and local agencies to present and projected services and practices. Basic principles of biostatistics and epidemiology are included.

3 class hours, 10 weeks. Credit, 2.

Dr. John Ayres, Commissioner of Health, Springfield.

Unit II—58B—Principles and Practices in Public Health Nursing.

A basic course in public health nursing coordinated with field experience in public health nursing agencies. The course is designed to provide the students with an understanding of the scope and objectives of public health nursing and the role of the public health nurse in a family-centered health service.

6 class hours; 30 hours public health nursing practice, 10 weeks. Credit, 4.

Miss Maher; Professional Staffs of the Springfield Visiting Nurse Association and Springfield Health Department.

65. Advanced Nursing

A senior course offered advanced instruction and practice in clinical nursing. The principles of management as applied to nursing care of patients in a hospital nursing unit will be integrated throughout the course.

6 class hours; 16 hours clinical nursing laboratory, 20 weeks. Credit, 8.

The Nursing Faculty and Resource Personnel.

66. (II) Senior Nursing Seminar

The course aims to give the student increased understanding of the opportunities, privileges and responsibilities facing the professional nurse in modern society and of the functions of organized professional nursing groups.

Nursing problems are studied through an individual and group approach and an opportunity is afforded the student to apply the principles of methodology and educational research in the study of a specific nursing problem.

4 class hours, 16 weeks. Credit, 4.

Miss Macdonald and Resource Personnel.

67. Social and Historical Foundations of Nursing

A survey course of nursing history from the pre-Christian era to the present. The influence of society upon nursing in the various historical periods is considered in relation to the development of nursing as a profession.

2 class hours, 16 weeks.

Miss Maher.

PHILOSOPHY

Professor Shute, Assistant Professor Rogers, Mr. Ehrlich.

25. (I) and (II) Introduction to Philosophy

A study of the distinctive role of philosophy in its relations to the insights of science, religion, and art. The student is introduced to some of the general questions, ideas, theories, and methods of inquiry which have given direction to Western thought, and encouraged to clarify and examine his own ideas regarding knowledge, reality, and value.

3 class hours. Credit, 3.

The Department.

31. (I) and (II) Introduction to Logic and Scientific Method

A study of the principles, problems and methods of critical thinking, emphasis upon principles and methods of formal logic; critical study of inductive reasoning and scientific method with applications to current problems.

3 class hours. Credit, 3.

Mr. Rogers, Mr. Ehrlich.

PHILOSOPHY

42. (I) and (II) Social and Personal Ethics

An examination of the many causes and contexts of personal decision and policy formation; an analysis of classical and contemporary theories which attempt to provide an intellectual framework for the guidance and justification of ways of life; and class exploration of concrete cases which focus attention on the realms of value and the place of theory in reflective choice.

3 class hours. Credit, 3.

Mr. Rogers, Mr. Ehrlich.

51. (I) History of Philosophy—Ancient and Medieval

A survey of development of western thought with emphasis on the cultural factors which generated and interacted with the successive philosophical interpretations of man's experience.

3 class hours. Credit, 3.

Mr. Shute.

52. (II) History of Philosophy—Modern

Attention is centered on the impact of modern science on the development of man's comprehensive understanding of the world, of the powers and limitations of knowledge, and of the basis of his valuations.

3 class hours. Credit, 3.

Mr. Shute.

53. (I) The Philosophy of Plato (1959-60)

A number of the later dialogues are read for their analysis of the major philosophical problems and proposed solutions in ethics, politics, science, religion, metaphysics, and epistemology. Attention is given to the influence of Plato's philosophy in the development of certain twentieth century philosophies. Given in alternate years.

3 class hours. Credit, 3.

Prerequisite, Philosophy 25 or 51. Mr. Shute.

55. (I) The Philosophy of Aristotle (1958-59)

Selections from the works of Aristotle are studied with a view to increased understanding both of the formulation which Aristotle gave to leading categories of thought in natural science, ethics, aesthetics, psychology, metaphysics, and epistemology, and of Aristotle's systematic theory in these fields. Given in alternate years.

3 class hours. Credit, 3.

Prerequisite, Philosophy 25 or 51. Mr. Shute.

58. (II) Philosophy in the Age of Enlightenment

A study of representative thinkers of the Cartesian and British empiricist traditions is followed by an examination of the relation between the Kantian approach to metaphysics and epistemology and those which characterize these traditions. Attention is given to the impact of the rise of modern science on the development of philosophy during this age.

3 class hours. Credit, 3.

Prerequisite, Philosophy 25 and permission of instructor, or 52.

Mr. Ehrlich.

61. (I) Contemporary Philosophies

A survey of the intense activity in present-day American and European thinking as exemplified by the great diversity of problems, methods, and per-

spectives. Representative directions of thought to be considered are Naturalism, Idealism, Realism, Existentialism, Pragmatism, Positivism.

3 class hours. Credit, 3.
Prerequisite, Philosophy 52, or 58, or 25 and permission of instructor.
Mr. Ehrlich.

64. (II) Existential Philosophies

The main problems peculiar to this movement as a whole and to its main exponents individually (i.e., Nietzsche, Kierkegaard, Jaspers, Heidegger, Sartre, Marcel) will be critically examined. Selections from at least three of the named thinkers will read. The philosophical background and the significance of the existential philosophies will be considered.

3 class hours. Credit, 3.
Prerequisite, Philosophy 51, or 52, or 25 and permission of instructor.
Mr. Ehrlich.

67. (I) American Pragmatism

A study of the characteristically American reinterpretations of the main strands of Western thought and of uniquely American contributions to philosophy. The sources of pragmatism in New England thought and in the American experience will be explored. Intensive study will be made of the work of William James and John Dewey.

3 class hours. Credit, 3.
Prerequisite, Philosophy 25, or 51, or 52. Mr. Rogers.

68. (II) Oriental Philosophies

A study of the present conflict in ideologies within and between the leading cultures of Asia, understood in the light of their philosophical history. The bearing of philosophical differences between East and West on the problem of mutual understanding.

3 class hours. Credit, 3.
Mr. Shute.

72. (II) Philosophy of Science

A study of the backgrounds, presuppositions, methods and general theories of modern physical, biological and social sciences. Readings selected from the works of leading scientists and philosophers will be used as the basis of class discussions which will attempt to explore the great achievements of our time and to assess their importance in the student's construction of a mature philosophic orientation.

3 class hours. Credit, 3.
Mr. Rogers.

81. (I) Philosophy of Religion

A survey of the contrasting types of religious philosophy in the contemporary western world and Asia, with a critical and constructive study of basic issues, such as the meaning of knowledge in the field of religion, the nature of faith, and the religious interpretation of reality.

3 class hours. Credit, 3.
Mr. Shute.

82. (II) Aesthetics

A study of the leading modern theories of the nature of art, the analysis of aesthetic experience, the distinctive function of art in culture and personality, and the principles of criticism.

3 class hours. Credit, 3.
Mr. Shute.

PHYSICAL EDUCATION

85. (I) Metaphysics

The field of metaphysics defined in distinction from the field of science, contrasting theories of reality offered by contemporary naturalism and idealism, especially in the light of recent developments in biological and physical science; analysis of basic ideas which will enable the student to continue a fruitful development of his own philosophy.

3 class hours. Credit, 3.

Mr. Shute.

86. (II) Theory of Knowledge

Types of knowledge and correlated methods of knowing; questions of certainty, probability, and limits of knowledge; ways of expression, such as mathematical formulae, language, and art, and their involvement in the knowing process; the nature of the relation between the knowing subject and the known object.

3 class hours. Credit, 3.

Mr. Ehrlich.

PHYSICAL EDUCATION FOR MEN

Professor Kauffman, Associate Professor Briggs, Associate Professor Rogers, Associate Professor Footrick, Assistant Professor Ricci, Assistant Professor Bosco, Assistant Professor Garber, Assistant Professor Kosakowski, Assistant Professor Bischoff, Mr. Douglas, Mr. James, Mr. Cobb.

ACTIVITY COURSES

3. (I) 4. (II) Physical Education

The object of the course is to help every student, through regularity and continuity of physical activity, to realize not only his physical and mental capacities, but learn to use them as an intelligent, cooperative, and efficient citizen. The students are given motor ability tests, expected to learn to swim and to meet minimum standards in the basic skills through participation in team sports and exercise.

3 class hours. Credit, 1.

The Department.

33. (I) 34. (II) Physical Education

A continuation of Physical Education 3 and 4.

3 class hours. Credit, 1.

The Department.

SKILLS AND TECHNIQUES IN PHYSICAL EDUCATION

The following courses are concerned with the methods and techniques of applied physical education. Classroom presentation, field, court, and floor demonstrations are emphasized. These courses are primarily for students enrolled for a Bachelor of Science degree with a major in physical education. Non-major admission only by permission of the instructor.

5. (I) Skills and Techniques

Development of fundamental skills and methods of teaching and organizing groups for participation in lacrosse. Fundamental skills and instructions in teaching elementary apparatus, pyramids, and construction of gymnastic routines.

60 clock hours per semester. Credit, 1.

Mr. Garber, Mr. Bosco.

6. (II) Skills and Techniques

Development of fundamental skills and instructions in teaching tumbling exercises and trampoling. Fundamental skills and instruction in teaching badminton.

60 clock hours per semester. Credit, 1.

Mr. Bosco, Mr. Ricci.

35. (I) Skills and Techniques

Development of fundamental skills, methods of teaching and organizing groups for participation in soccer, and wrestling.

60 clock hours per semester. Credit, 1.

Mr. Briggs, Mr. Douglas.

36. (II) Skills and Techniques

Fundamental skills in life-saving and water-safety methods. Successful completion resulting in qualifications as American Red Cross Water Safety Instructor.

60 clock hours per semester. Credit, 1.

Mr. Rogers.

63. (I) Skills and Techniques

Fundamental skills and techniques of teaching track and field and basketball.

60 clock hours per semester. Credit, 1.

Mr. Footrick, Mr. Curran.

64. (II) Skills and Techniques

Instruction and participation in indoor and outdoor games of high and low organization. Instruction in skills in archery and participation in various types of competitive events.

60 clock hours per semester. Credit, 1.

Mr. Briggs, Mr. Douglas.

83. (I) Skills and Techniques

Fundamental skills, instruction in techniques of teaching tennis and rhythmics.

60 clock hours per semester. Credit, 1.

Mr. Kosakowski, Mr. Bosco.

84. (II) Skills and Techniques

Fundamental skills and techniques of teaching volleyball and golf.

60 clock hours per semester. Credit, 1.

Mr. Ricci, Mr. Garber.

MAJOR COURSES

21. (I) Introduction to Physical Education

Origins of physical education, fundamental concepts, current status in education, qualifications and professional opportunities in the field.

3 class hours. Credit, 3.

Mr. Kauffman.

22. (II) First Aid and Safety

Materials applicable to the immediate care of the injured, causes of accidents and procedures designed to develop habits and attitudes leading to safe behaviour through desirable safety practices. Certified by American Red Cross for First Aid Instructor training.

3 class hours. Credit, 3.

Mr. Briggs.

PHYSICAL EDUCATION

23. (I) Principles and Practices in Health Education

Principles of maintaining and improving individual health, pupil needs, fundamentals related to planning instruction on the elementary and secondary school level, resources in health education, evaluation of materials.

3 class hours. Credit, 3.

Mr. Douglas.

41. (I) Human Anatomy

A study of the gross structure and function of the human body.

3 class hours. Credit, 3.

Mr. Ricci.

42. (II) Kinesiology

A course aimed to give the anatomical application basic to a thorough understanding of the mechanical problems in motor skills.

3 class hours. Credit, 3.

Prerequisite, Physical Education 41. Mr. Bosco.

53. (I) Physical Education in Elementary Schools

Aims and objectives of modern materials and methods of teaching group games, rhythmic activities, dance relays, stunts and lead-up games for the elementary school.

2 class hours; 1 2-hour laboratory period. Credit, 3.

Mr. Footrick.

54. (II) Physical Education in Secondary Schools

A course in modern methods of teaching physical education in secondary schools. Includes objectives, content material, and organization procedures at the secondary level.

3 class hours. Credit, 3.

Mr. Bischoff.

55. (I) Organization and Administration of Physical Education

Problems and procedures in physical education, organization of programs, class schedules, classification of students, equipment, records, finance, intramurals, construction and maintenance of gymnasia, swimming pools, locker rooms, and outdoor play areas.

3 class hours. Credit, 3.

Mr. Kauffman.

57. (I) Methods and Materials: Coaching Baseball, Gymnastics

Designed to develop individual skills and techniques of teaching and coaching baseball and gymnastics.

1 class hour; 1 2-hour laboratory period. Credit, 2.

Mr. Lorden, Mr. Bosco.

58. (II) Methods and Materials: Coaching Track, Football

Designed to develop individual skills and techniques of teaching and coaching track and football.

1 class hour; 1 2-hour laboratory period. Credit, 2.

Mr. Footrick, Mr. O'Rourke.

59. (I) Adaptive Physical Education

A program of developmental activities, games, sports, and rhythms suited to the interests, capacities and limitations of students with disabilities who may

not safely engage in unrestricted participation in the vigorous activities of the general physical education program.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Physical Education 42. Mr. Garber.

71. (I) 72. (II) Special Problems Course

Presentation and discussion of research work in physical education, health, or athletics.

3 class hours. Credit, 3.
Mr. Bischoff.

74. (II) Tests and Measurements

This course considers the status of measurements in physical education, an historical sketch, typical of contributions in anthropometrics, strength tests, ability and achievement tests, cardiac functional tests, neuro-muscular control tests, and sports technique tests; and it includes the tools of measurement, indices, and the theory and practice of test administration.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Ricci.

75. (I) Athletic Injuries—Prevention and Care

The use of proper personal and field equipment, support methods, conditioning exercises, the medical examination, therapeutic aids, and the clinical use of physiotherapy equipment.

2 class hours. Credit, 2.
Prerequisite, Physical Education 42. Mr. Ricci.

76. (II) Philosophy and Principles of Physical Education

Contemporary interpretations and critical analysis. The compilation and organization of material in a functional relationship for the foundation of policies and program construction.

3 class hours. Credit, 3.
Mr. Garber.

78. (II) Physiology of Exercise

Application of basic physiological concepts to the program of physical education, emphasis upon the physiological effects and adjustments accruing from participation in physical activity. Major factors in diet, conditioning, fatigue, and physical fitness are considered.

3 class hours. Credit, 3.
Prerequisite, Physical Education 42. Mr. Bosco.

80. (I) and (II) Driver Education Instructor Course

This course includes driver education and driver training at the instructor's level, and is designed to orient the student to live safely through skillful and efficient behavior on streets and highways. Leads to certification as instructor in driver education and driver training.

2 class hours. Credit, 2.
Mr. Briggs.

82. (II) Methods and Materials: Coaching Soccer, Basketball

Designed to develop individual skills and techniques of teaching and coaching soccer and basketball.

1 class hour; 1 2-hour laboratory period. Credit, 2.
Mr. Briggs, Mr. Curran.

PHYSICAL EDUCATION FOR WOMEN

Professor Totman, Assistant Professor Hubbard†, Assistant Professor Riggs, Miss Ogilvie, Miss Reid, Miss Wallace, Miss Rupp.

7. (I) 8. (II) Physical Education

Students are required to participate in one term of dancing, in one team sport, and to pass a safety test in swimming. Except for these requirements, all unrestricted students may select any activity which is offered. Fall season: field hockey, volleyball, soccer, archery, tennis, swimming. Winter season: basketball, volleyball, badminton, swimming, life saving (by permission), modern dance, square dance, calisthenics, posture training. Spring season: softball, soccer, archery, swimming, modern dance.

3 class hours. Credit, 2.

The Department.

27. (I) 28. (II) Physical Education

The activities offered in Courses 7 and 8 are continued. In addition, advanced modern dance is offered in the fall season and water safety instruction in the winter season. Unrestricted students may select any activity which is offered.

3 class hours. Credit, 2.

The Department.

63. (I) 64. (II) Teaching Sports for Secondary Schools

Designed to give the fundamentals of teaching and officiating of team sports for women appropriate for the secondary school level. Course content includes development and knowledge of techniques, knowledge of rules, teaching progressions, class procedures, and instruction in officiating related to the following activities: hockey, soccer, speedball, volleyball, basketball, and softball.

1 class hour; 3 laboratory hours. Credit, 2.

Miss Riggs.

65. (I) Play Activities and Games for Elementary Schools

A study of the place of physical education in the schools with emphasis on procedures, organization and teaching techniques. There will be opportunity to learn games and other play activities for children from 5 to 14 years.

1 class hour; 3 laboratory hours. Credit, 2.

Miss Totman.

66. (II) Rhythms and Dancing for the Elementary School

The course will include the development of rhythmic sense through basic motor skills; dramatizations; the construction of simple dance forms; folk dances and singing games. There will be practice in planning the rhythm and dance program in the elementary school from nursery school through sixth grade.

1 class hour; 3 laboratory hours. Credit, 2.

Miss Hubbard, Miss Rupp.

68. (II) Water Safety Instructor Course

This course includes a review of the techniques of senior life saving and gives training in the Red Cross Water Safety Course. A detailed study is made of the organization and teaching of all levels of swimming and diving in various situations. Especial emphasis is given to safety practices. Successful completion results in certification as American National Red Cross Safety Instructors.

2 scheduled periods. Credit, 2.

Miss Wallace.

†On leave of absence.

PHYSICS

Professor Trimmer, Professor Alderman, Professor Ross, Professor Rosen, Assistant Professor Mathieson, Assistant Professor Fisher, Mr. Crooker, Mr. DeFilippes.

25. (I) Mechanics, Sound, and Heat

This course is largely a study of the following and related topics: equilibrium of bodies; forms of energy; motion, fluids; surface tension; molecular phenomena; elasticity; wave-motion; sound; thermometry; expansion; hygrometry; transmission of heat; changes of radiation.

3 class hours; 1 2-hour laboratory period. Credit, 4.
Prerequisite, Mathematics 5, 7, or 14. The Department.

26. (II) Light and Electricity

Includes wave-theory of light; optical instruments; analysis of light; interference; polarization; magnetism; electrostatics; production and properties of electric currents; electrical appliances and machines; oscillatory circuits; vacuum tubes, and related topics.

3 class hours; 1 2-hour laboratory period. Credit, 4.
Prerequisite, Physics 25. The Department.

27. (I) General Physics

The topics covered are mechanics, sound, and heat with special emphasis on the mathematical development of statics, centroids, and Gauss' theorem.

3 class hours; 1 2-hour laboratory period. Credit, 4.
Prerequisites, Mathematics 5, 6, or equivalent; Mathematics 31 previously or concurrently. The Department.

28. (II) General Physics

The topics covered are light and electricity with special emphasis on the mathematical development of Gauss' theorem, dielectrics and A.C. electricity.

3 class hours; 1 2-hour laboratory period. Credit, 4.
Prerequisite, Physics 27. The Department.

51. (I) 52. (II) Magnetism, Electricity, Photo-electricity, Thermionics and Applications

Course 51 deals with direct currents (mesh currents often used); Course 52 with alternating currents (low and high frequency), application of thermionics, and photo-electricity. These courses are planned to give the student a good training in the theory and methods of measurement in the indicated and allied subjects. Modern methods are stressed and instruments of precision are used.

2 class hours; 1 2-hour laboratory period. Credit, 3.
8:00-8:50 Tu. Th.; 10:00-11:50 Tu. or 1:00-2:50 W. or Th. Mr. DeFilippes.
Prerequisites, Physics 26 and Mathematics 30 for Course 51; Physics 51 for Course 52.

54. (II) Meteorology

The course deals with the application of certain concepts of mechanics and thermodynamics to the consideration of various atmospheric phenomena such as condensation, pressure, radiation, motion, fronts, etc. The treatment is theoretical in nature but the observed phenomena are correlated to the

theory with a descriptive approach. The laboratory deals with weather observations, preparation of weather charts, and the techniques of weather forecasting.

2 class hours; 1 2-hour laboratory period. Credit, 3.
2:00-2:50 Tu. Th.; laboratory hours by arrangement. Mr. Crooker.
Prerequisites, Physics 26; Mathematics 30.

55. (I) 56. (II) Mechanics

Development of the fundamental concepts of dynamics with applications to particles and rigid bodies in translation and rotation. One laboratory period may be substituted for one class hour.

3 class hours. Credit, 3.
9:00-9:50 Tu. Th.; laboratory by arrangement. Mr. Ross.
Prerequisites, Physics 26; Mathematics 30.

57. (I) Introduction to Astronomy

The general facts and principles of astronomy, mainly qualitative, starting with basic physical principles. Periods of evening observation will be substituted for lecture hours when feasible. This course may not be taken for major credit in Physics.

3 class hours. Credit, 3.
8:00-8:50 M. W. F. Mr. Ross.
Prerequisite, Mathematics 7 or equivalent.

58. (II) Photography

Class work and laboratory practice in the fundamentals of photography. Types of cameras, characteristics of photographic emulsions, exposure and exposure meters, processing of negatives and prints, enlarging, composition, photomicrography. Limited to ten students. This course may not be taken for major credit in Physics.

2 class hours; 1 4-hour laboratory period. Credit, 3.
3:00-3:50 M. W.; 1:00-5:00 F.
Prerequisites, Physics 25, 26; Chemistry 1, 2; Mathematics 10.

60. (II) Sound and Acoustics

A study of vibrations, vibrating bodies, coupled systems, sound structure, and acoustic properties. The work will include many applications of sound to technical and commercial fields.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisites, Physics 26; Mathematics 30. Mr. Alderman.

61. (I) 62. Heat and Thermodynamics

A study of heat exchanges and energy changes due to heat in systems of matter. The subject material and experimental methods are useful in other branches of science.

2 class hours; 1 2-hour laboratory period. Credit, 3.
10:00-10:50 Tu. Th.; laboratory by arrangement. Mr. Alderman.
Prerequisites, Physics 26; Mathematics 30.

63. (I) 64. (II) Optics

An intermediate course in the theory of light. Work in geometrical and physical optics is done. Precision instruments are used in the laboratory.

2 class hours; 1 2-hour laboratory period. Credit, 3.
1:00-1:50 Tu. Th.; laboratory hours by arrangement. Mr. Alderman.
Prerequisites, Physics 26; Mathematics 29.

75. (I) 76. (II) Advanced Experimental Work in Selected Topics

These courses are largely experimental and the subject matter is adapted to the needs of the individual student. The research viewpoint is emphasized. The class hour is used for a course in precision of measurements.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisites, Mathematics 29, 30; two of the following year courses: Physics 51-52, 55-56, 61-62, 63-64. The Department.

85. (I) 86. (II) Modern Physics

Typical subjects studied are theories of the atom, radiation, quantum theory; spectra, X-ray analysis, nuclear reactions.

3 class hours. Credit, 3.
9:00-9:50 M. W. F. Mr. Rosen.
Prerequisites, Physics 52, and 6 other junior-senior physics credits; Mathematics 30.

95. (I) 96. (II) Electronics

2 class hours; 1 2-hour laboratory period. Credit, 3.
10:00-10:50 M. F.; 10:00-11:50 W. Mr. Trimmer.
Prerequisites, Physics 51, 52; Mathematics 29, 30.

POULTRY HUSBANDRY

Professor Fox, Professor Sanctuary, Associate Professor Vondell, Associate Professor Smyth, Assistant Professor Banta, Assistant Professor Houch, Assistant Professor Anderson.

25. (I) General Poultry

For students not majoring in poultry husbandry. A general course giving an introduction to the breeds of poultry, the principles and practice of breeding, incubation, and poultry nutrition, brooding and rearing, houses and equipment, management practices, disease control, marketing poultry products, and the business of poultry keeping.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 M. F.; 10:00-11:50 or 3:00-4:50 T. Mr. Fox, Mr. Vondell.

52. (II) Incubation and Brooding

This course is based upon the actual operation of incubators and brooders. Each year a research project is planned and data obtained concerning the effects of various incubator adjustments upon malpositions and maldevelopment of embryos and the percentage of hatch. Studies of temperature gradients, chick behavior and development are made in brooding with various types of equipment. Analysis is made of common and unusual field problems.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
11:00-11:50 W.; 3:00-4:50 M.; other hours by arrangements.
Mr. Sanctuary.

53. (I) Poultry Judging

Physiological and anatomical characters are used in production judging. The American Standard of Perfection is employed in a study of the more popu-

lar breeds and varieties, and for exhibition judging. Judging teams competing in the Eastern Intercollegiate Contest are trained in this course.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
8:00-8:50 Tu.; 1:00-2:50 Th. F. Mr. Banta.

55. (I) Poultry Housing and Sanitation

In this course are considered the biological factors related to the proper physical environment necessary for growth, health, and reproduction. Various systems of ventilation and methods of insulation are studied and demonstrated by models. Humidity, temperature, and condensation studies are made at the poultry plant with varying adjustments of ventilation devices. A study is made of modern equipment. Sanitation from the standpoint of disease prevention practices is also considered.

1 class hour; 1 2-hour laboratory period. Credit, 2.
9:00-9:50 Th.; 1:00-2:50 Tu. Mr. Sanctuary.

56. (II) Poultry Nutrition

A study of the scientific principles of nutrition, classification and identification of feedstuffs, formulation and calculation of rations for specific purposes. A class trip may be arranged.

2 class hours; 1 2-hour laboratory period. Credit, 3.
9:00-9:50 Tu. Th.; 1:00-2:50 W. Mr. Anderson.

75. (I) Marketing Poultry Products

A study of the preparation and grading methods of eggs and poultry products to meet the requirements of the northeastern markets. The laboratories are designed to cover the fields of modern dressing, processing and packaging of poultry; as well as grading, candling and quality studies of eggs. A one-half day class trip to Springfield markets in December is required. Estimated cost, two dollars.

1 class hour; 1 2-hour laboratory period. Credit, 2.
10:00-10:50 Tu.; 3:00-4:50 W. Mr. Vondell.

76. (II) Turkey Production

This course includes the production of ducks and geese but most of the time is given to the turkey industry; its importance, breeds, breeding, incubation, brooding, feeding, finishing, marketing, etc.

1 class hour; 1 2-hour laboratory period. Credit, 2.
1:00-1:50 M.; 3:00-4:50 W. Mr. Smyth.

77. (I) Poultry Breeding

The improvement of poultry by selection is developed through a study of the principles of heredity. The inheritance of morphological and physiological characters including plumage color, egg production, meat production, hatchability, egg traits, and disease resistance.

2 class hours; 1 2-hour laboratory period. Credit, 3.
11:00-11:50 M. W.; 1:00-2:50 W. Mr. Fox.

78. (II) Seminar and Farm Management

A combination seminar and lecture course designed to give the student a comprehensive view of all phases of the poultry industry. A field trip covering approximately three days will be arranged. Poultry majors with a B average in poultry courses may elect an additional problem credit.

3 class hours; 1 2-hour laboratory period may be elected. Credit, 3, 4.
9:00-9:50 M. W. F. Mr. Houch.

PSYCHOLOGY

Professor Neet, Professor Feldman, Professor Goss, Professor Kates, Associate Professor Field, Associate Professor Teichner, Associate Professor Epstein, Assistant Professor Myers, Mr. Clifford, Mr. Lewit, Mr. Levitt, Mr. Miller, Visiting Lecturer Mrs. Fielder, Visiting Lecturer Riggs.

26. (I) and (II) General Psychology

This is an introductory course dealing with the principles and applications of psychology with regard to the understanding of behavior. Topics considered include the development of behavior, intelligence and aptitudes, sensory and neural processes, learning, thinking, language, motivation, emotion, personality and the psychology of interpersonal relationships.

3 class hours. Credit, 3.
The Department.

28. (II) General Psychology

A continuation of Psychology 26. The nature and problems of adjustment are emphasized. Topics considered include frustration and conflict, adjustment mechanisms and behavior deviations.

3 class hours. Credit, 3.
Prerequisite, Psychology 26. Mr. Neet.

51. (I) Experimental Psychology

This course is designed to give an understanding of the problems, methods, and data of experimental psychology. One of the basic functions of the course is to acquaint the student with the scientific method as applied to psychological studies of behavior.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 26. Mr. Neet.

56. (I) and (II) Educational Psychology

A study of psychological facts and principles fundamental to education, teaching, and personal relationships between teacher and pupil. Topics considered in relation to school situations are: physical and mental growth, intelligence, motivation, emotions, learning, transfer of training and mental hygiene of teacher and pupil.

3 class hours. Credit, 3.
Prerequisite, Psychology 26. Mr. Miller.

61. (I) Social Psychology I

Development, interrelationships and functions of attitudes. Attitude and opinion assessment. Attitudes and personality. Attitude change and persuasion. Survey project involving interviewing by students.

3 class hours. Credit, 3.
Prerequisite, Psychology 26. Mr. Lewit.

62. (II) Social Psychology II

Structure, internal functions, and change of social groups. Emphasis upon social perception, norms, leadership, communication, and theory of group equilibrium. Group problem solving. Theory of inter-group relations.

3 class hours. Credit, 3.
Prerequisite, Psychology 26. Mr. Lewit.

PSYCHOLOGY

63. (I) Physiological Psychology

A study of the relationships between physiological processes and behavior. Major emphasis will be placed upon the structure and mechanisms of the central nervous system and sense organs, endocrine functions, and drives.

3 class hours. Credit, 3.
Prerequisites, Psychology 26; Zoology 35. Mr. Feldman.

72. (II) Advanced Experimental Psychology (1957-58)

The literature, techniques, and apparatus of experimental psychology are considered, and selected projects are carried out individually by the members of the class. Given in alternate years.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisites, Psychology 51; Zoology 35. Mr. Neet.

75. (I) Statistics in Psychology

The application of statistical procedures to the analysis of psychological data and to problems of measurement in psychology and related fields.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisites, Psychology 26; Statistics 77 or Mathematics 62. Mr. Myers.

81. (I) 82. (I) and (II) Psychological Tests

Different varieties of psychological tests are studied. The first semester surveys the field of testing and introduces the student to tests of intelligence, aptitude, interest, personality, and adjustment. The second semester is devoted to a more intensive study of individual intelligence tests in common use. Either semester may be elected independently.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 26. Mr. Miller.

83. (I) Abnormal Psychology

A study of the etiology, symptoms and therapy of the behavior abnormalities. The following are considered: neuroses, functional and organic psychoses, epilepsies, alcoholism and drug addiction, character disorders, speech disorders and mental deficiency. In discussing the development of the various abnormalities emphasis is placed on the relationship between the dynamics of the normal and the distorted personality. Hospital trips and clinics.

3 class hours. Credit, 3.
Prerequisite, Psychology 26. Mr. Kates.

86. (I) and (II) Industrial Psychology

A study of psychological principles and methods in business and industrial situations. Topics considered include: job analysis, job evaluation, employee selection and training, fatigue, techniques of motivation, measurement of morale and problems of leadership.

3 class hours. Credit, 3.
Prerequisite, Psychology 26. Mr. Teichner.

88. (II) Psychology of Guidance

A study of the psychological principles, techniques and tests necessary in guidance. Practice is given in organizing and evaluating relevant data in the analysis of illustrative cases.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisites, Psychology 26 and 81 or consent of the instructor.
Mr. Field.

90. (II) Contemporary Psychologies

A logical, historical, and systematic analysis of contemporary psychological theories, including structuralism, functionalism, Gestalt and organistic psychologies, psychoanalysis, and behaviorisms from Thorndike and Watson to the contemporary scene.

3 class hours. Credit, 3.
Prerequisite, Psychology 26. Mr. Goss.

92. (II) Clinical Psychology

A study of the techniques and methods involved in the diagnosis and treatment of behavior disorders. Diagnostic clinical testing, counselling, and other psychotherapeutic procedures are given consideration. Hospital trips and clinics.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Psychology 83 or consent of the instructor. Mr. Epstein.

93. (I) Psychology of Adolescence

A consideration of the development, and emotional, social and intellectual adjustment of the individual during the adolescent years.

3 class hours. Credit, 3.
Mr. Clifford.

94. (I) and (II) Child Psychology

This course aims to develop an understanding of the behavior of the child. Psychological aspects of the following topics are considered: original nature, maturation and development of behavior, language, habit formation, emotional behavior, development of intelligence and understanding, social behavior, motivation, personality, and mental hygiene. Nursery school observation and practice.

3 class hours. Credit, 3.
Prerequisite, Psychology 26. Mr. Clifford.

95. (I) 96. (II) Problems in Psychology

For qualified seniors. The student will be allowed to do independent work and study on special problems or in certain fields of psychological interest. By arrangement with the members of the department.

Credit, 1.
The Department.

RECREATION LEADERSHIP

Associate Professor Randall.

51. (I) Principles of Recreation

This course considers recreation as an important social force in community life. Emphasis is given to the study and discussion of functional recreation and park programs: their history and philosophy, their relationship with various agencies and related fields, their resources, current problems, and established principles. A field trip is required.

3 class hours. Credit, 3.
Mr. Randall.

52. (II) Group Leadership and Camp Counseling

A study of the organized camp and the counselor's part in it, including characteristics, objectives, organization, program, and operating procedures. Major emphasis is given to group leadership, camper guidance, and the acquisi-

tion of camping and program skills. Each student is expected to participate in role-playing, program leadership, committee presentations, and two field trips. One of these trips involves a two-night camping experience and the cooking of five meals out-of-doors. Total cost is less than five dollars.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Randall.

74. (II) The Recreation Program

Major emphasis is placed upon a term project in which each student plans a complete and well-rounded recreation program to meet the needs, interests, and abilities of the community which he studied intensively in Sociology 51. Program planning principles and resources are discussed and applied in selected examples. A field trip is required. Students planning to take this course should consult the instructor before the time of pre-registration.

3 class hours. Credit, 3.
Prerequisites, Recreation Leadership 51; Sociology 51. Mr. Randall.

77. (I) Organization and Administration of Community Recreation

A study of staff organization; personnel recruitment, training and supervision; legal aspects; planning and maintenance of areas, facilities and equipment; finances, business procedure, and public relations. Attention is given to public and private recreation agencies. A field trip is required.

3 class hours. Credit, 3.
Prerequisite, Recreation Leadership 74. Mr. Randall.

79. (I) 80. (II) Recreation Leadership Guidance and Practice

Field experience, involving administrative procedures, in a program leadership capacity in a public or private agency of the student's choice within commuting distance of the university. Supervision is shared by the department and a member of the professional staff of the agency.

Admission by permission of the department.
1 class hour; field work as required.
Mr. Randall and Cooperating Agency.

RELIGION

Chaplains Father David J. Power, Rabbi Louis Ruchames, the Reverend Albert L. Seely, and visiting lecturers: the Reverend Thayer A. Greene, the Reverend Ewald Mand, and others.

15. (I) 16. (II) A History of Jewish Thought and Culture

A survey of Jewish thought and culture from the Bible to contemporary times. Particular emphasis will be placed upon the relevance of such thought to contemporary religious and philosophical problems. Among the thinkers to be discussed will be Jeremiah, Ecclesiastes, Philo, Maimonides, Spinoza, Achad-Ha'am, and Will Herberg.

1 hour. No Credit.
Mr. Ruchames.

17. (I) 18. (II) Basic Beliefs and Practices of Judaism

A study of the fundamental principles and practices of Judaism. An examination of the philosophy of Judaism is followed by an analysis of its customs and ceremonies.

1 hour. No Credit.
Mr. Ruchames.

20. (II) Introduction to the Old Testament

An introduction to the history, literature, and religion of the Old Testament. The historical problems of the individuál books are studied, their message for their own period examined, and their significance for the Christian faith explored. The aim is to give a clear concept of the beginnings of Hebrew religion and thus to help understand and evaluate the Old Testament as an integral part of the Christian Bible and faith.

1 hour. No Credit.

Mr. Mand.

31. (I) The Life and Message of Jesus

Based primarily on the Synoptic Gospels, the course will interpret the life and ministry of Jesus in the light of his Old Testament heritage and in terms of his unique significance. Being a Christian will be seen from the Biblical viewpoint as commitment to God as known through Jesus Christ.

1 hour. No Credit.

Visiting Lecturer.

41. (I) 42. (II) Catholic Faith and Practice

A seminar with exposition and discussion of questions concerning Roman Catholic dogmas and practices.

1 hour. No Credit.

Fr. Power.

60. (II) Christian Faith and Human Relations

A study of the relevance of Christian theology to the problems of human existence. Making use of the insights of modern depth psychology in personal relations, the course will deal with what it means to be a person and what this implies for the various relationships of life, i.e., friendship, courtship, marriage, relation to parents and to children. Attention will be given to the insights of Christian theology upon the sexual relationship.

1 hour. No Credit.

Mr. Greene.

71. (I) 72. (II) Essentials of Protestant Christianity

A study of the main tenets of Protestant belief and action. The aim is to help the student clarify and strengthen his own convictions through examination of topics such as man's knowledge of God, the person and mission of Jesus Christ, the nature of the Church, and the relation of Christian ethics to personal living and the social order.

1 hour. No Credit.

Courses in Elementary and Intermediate Hebrew, and Elementary Yiddish are offered by Rabbi Ruchames. These are open to all students.

Mr. Seely.

ROMANCE LANGUAGES

Professor Goding, Professor Ferrigno, Associate Professor Clarke, Associate Professor Wexler, Associate Professor Johnson, Assistant Professor Greenfield, Assistant Professor Hull, Miss Tillona, Mr. Fraker, Miss Landro, Mr. Smith, Miss Cordones, Mrs. Bradford, Mr. Myerstein, Miss Regalade.

FRENCH

1. (I) 2. (II) Elementary French

For those who have had no previous courses in French. Intensive drill for rapid reading, writing, speaking and understanding. No credits in this course

may be applied toward a degree until the close of the second semester, except upon special recommendation from the Provost.

3 class hours; 1 laboratory hour. Credit, 3.

The Department.

5. (I) 6. (II) Intermediate French

Readings from representative works of French literature. Composition, grammar review, intensive oral practice.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisites, French 1 and 2, or two years of high school French.

The Department.

7. (I) Intermediate French; French Life and Culture

Selected readings from representative French literary works and a thorough review and study of grammar. Composition, intensive oral practice.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisites, 2 or 3 years of high school French and permission of the department.

The Department.

8. (II) Intermediate French; French Life and Culture

Intensive reading of works of the late nineteenth century and modern period: Zola, Maupassant, Mauriac, Giono, Saint-Exupery, Malraux, Sartre, Camus, and others.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisite, 2 or 3 years of high school French or permission of the department.

The Department.

25. (I) 26. (II) Introduction to French Literature

A study of French masterpieces in complete text: Montaigne, Voltaire, Rousseau, Balzac, Flaubert, Camus, and others. An analysis of the best of French poetry. Plays of the medieval, Romantic and modern theater.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisites, French 7 and 8, or 5 and 6 and permission of the department.

Mr. Goding, Mr. Johnson.

27. (I) 28. (II) Oral Practice

A course designed to enable the student to express himself adequately in French on subjects pertaining to daily life activities and on general topics of interest from the contemporary French point of view. Conducted entirely in French.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisites, French 5 and 6 or equivalent or permission of the instructor.

Mr. Smith, Mr. Meyerstein.

ADVANCED COURSES

51. (I) French Literature of the Eighteenth Century (1958-59)

Development of the ideas of the French Enlightenment. Readings from Montesquieu, Diderot, and others; detailed study of the works of Voltaire. Given in alternate years.

3 class hours. Credit, 3.

Mr. Hull.

52. (II) French Literature of the Eighteenth Century (1958-59)

Selected novels and plays representative of the Age of Enlightenment in France. Detailed study of the works of Rousséau, his precursors and disciples. Given in alternate years.

3 class hours. Credit, 3.

Mr. Hull.

53. (I) The French Novel of the Twentieth Century

A critical study of the characteristics and trends of the contemporary French novel from Proust to the present, with emphasis on Gide, Colette, Duhamel, Montherlant, Mauriac, Saint-Exupery, Giono, Sartre, Camus, Estang, and others.

3 class hours. Credit, 3.

Miss Clarke.

54. (II) The French Theater of the Twentieth Century

A critical study of the trends in the modern French theater since Scribe as a reflection of the prevalent interests and problems of the French public.

3 class hours. Credit, 3.

Miss Clarke.

55. (I) French Literature of the Seventeenth Century (1957-58)

A study of the main genres of the French Age of Classicism through readings of complete texts: the poetic schools of Malherbe and Regnier, Boileau, La Fontaine; the philosophy of Descartes and Pascal; the prose contribution of La Rochefoucauld, La Bruyere, Mme. de Sevigne, Mme. de la Fayette. Given in alternate years.

3 class hours; 1 discussion hour. Credit, 3.

Mr. Johnson.

56. (II) The Theater in the French Age of Classicism (1957-58)

After a study of the historical development of French drama to 1625, an analysis of the theater of Corneille, Racine and Moliere. Explications de texte. Given in alternate years.

3 class hours; 1 discussion hour. Credit, 3.

Mr. Johnson.

57. (I) French Romanticism of the Nineteenth Century (1958-59)

A study of the principal works in prose, poetry, and drama of the Romantic period, including those of Chateaubriand, Lamartine, De Vigny, Hugo, Musset, and others. Given in alternate years.

3 class hours; 1 discussion hour. Credit, 3.

Mr. Goding.

58. (II) French Literature of the Nineteenth Century (1958-59)

A study of the main genres, schools and movements after the Romantic period. Emphasis is placed upon influences on the other arts. Given in alternate years.

3 class hours; 1 discussion hour. Credit, 3.

Mr. Goding.

75. (I) 76. (II) Cours de Style

A study of syntax and idioms at an advanced level. The student is taught how to express himself clearly and logically in living French.

3 class hours; 1 laboratory hour. Credit, 3.

79. (I) French Civilization (1959-60)

A study of those elements which lie back of the cultural contribution of France to world civilization. Subjects studied will include arts, sciences, school systems, the press, the family, social classes, influences of history and geography. The assigned readings will be drawn from contemporary French literature. Given in alternate years.

3 class hours; 1 laboratory hour. Credit, 3.
Mr. Goding.

80. (II) Advanced Language Study (1957-58)

Methods of teaching; review of grammar and pronunciation.

3 class hours; 1 laboratory hour. Credit, 3.
Mr. Goding.

ITALIAN

1. (I) 2. (II) Elementary Italian

For those who have had no previous courses in Italian. The essentials of Italian grammar, intensive drill in pronunciation, conversation and composition. Extensive reading of modern Italian writings. No credits in this course may be applied toward a degree until the close of the second semester except upon special recommendation from the Provost.

3 class hours; 1 laboratory hour. Credit, 3.
Miss Tillona.

5. (I) 6. (II) Intermediate Italian

Systematic review of grammar, readings from modern authors, intensive oral drill, continued composition and conversation.

3 class hours; 1 laboratory hour. Credit, 3.
Prerequisites, Italian 1 and 2 or equivalent. Miss Tillona.

25. (I) 26. (II) Introduction to Italian Literature (1958-59)

This course traces the development of Italian literature from the 13th through the 20th centuries. The course is conducted in Italian. Given in alternate years.

3 class hours; 1 laboratory hour. Credit, 3.
Prerequisites, Italian 5 and 6 or permission of the department.
Mr. Ferrigno.

27. (I) 28. (II) Oral Italian (1959-60)

This course is intended for those students who wish to perfect their knowledge of the spoken language. Given in alternate years.

3 class hours; 1 laboratory hour. Credit, 3.
Prerequisites, Italian 5 and 6 or permission of the department.
Mr. Ferrigno.

SPANISH

1. (I) 2. (II) Elementary Spanish

For students who have had no training in Spanish. The essentials of Spanish grammar, intensive oral drill in pronunciation, fundamentals of conversation and composition, and extensive reading of short stories. No credits in this course may be applied toward a degree until the close of the second semester, except upon special recommendation from the Provost.

3 class hours; 1 laboratory hour. Credit, 3.
The Department.

5. (I) 6. (II) Intermediate Spanish

Intensive grammar review and oral drills; intensive and extensive readings from selected modern texts.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisites, Spanish 1 and 2 or two years of high school Spanish.

THE DEPARTMENT.

7. (I) 8. (II) Intermediate Spanish: Hispanic Cultures

Intensive grammar review and oral drills; introduction to Hispanic cultures through intensive and extensive reading of selected modern texts.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisites, 2 or 3 years of high school Spanish and permission of the department, or Spanish 1 and 2 with a grade of B or better. MR. GREENFIELD.

25. (I) 26. (II) Introduction to Spanish Literature

This course traces the development of Spanish literature from the 12th through the 20th centuries. Readings from some of the most important works. The course is conducted largely in Spanish. Either semester may be elected independently.

3 class hours; 1 discussion hour. Credit, 3.

Prerequisites, Spanish 5 and 6 or permission of the department.

MR. FERRIGNO.

27. (I) 28. (II) Oral Spanish

Primary emphasis is placed on the oral aspects of the language: pronunciation, vocabulary building, reading, comprehension, preparation of speeches, group discussions, and conversations. Considerable attention is also paid to those elements of grammar required for correct and fluent use of the language. Recommended for major students and for those who desire a good command of the language as spoken currently in Spain and Spanish-America.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisites, Spanish 5 and 6 or permission of the department.

MR. WEXLER.

63. (I) 64. (II) Advanced Spanish Composition and Syntax (1959-60)

A study of syntax and idioms, and of those more advanced and difficult elements which constitute stylistics. An abundance of original composition leads the student to express himself clearly, logically, and fluently in living Spanish. Open to juniors and seniors majoring in Spanish and to other qualified students by permission of the department. Given in alternate years.

3 class hours; 1 laboratory hour. Credit, 3.

Prerequisites, Spanish 27 and 28, and at least one course in Spanish literature.

81. (I) The Romanticists (1958-59)

The course is based on the principal Spanish and Spanish-American writers of the Romantic movement (1808-50 and 1832-88, respectively). Conducted in Spanish. Given in alternate years.

3 class hours; 1 discussion hour. Credit, 3.

Prerequisites, Spanish 25 and 26 or permission of the department.

MR. WEXLER.

82. (II) The Modernists (1958-59)

Studies in the prose and poetry of Spanish-American Modernism (1880-1910) and its influence on peninsular Spanish literature. Conducted in Spanish. Given in alternate years.

3 class hours. Credit, 3.
Prerequisites, Spanish 25 and 26 or permission of the department.
Mr. Greenfield.

83. (I) Drama of the Golden Age (1959-60)

The course deals primarily with the *comedia* during the period of maximum creation, 1556-1600. Considerable attention is paid also to the dramatists of the Renaissance (1474-1556) and of the Baroque era (1600-1700). Conducted in Spanish. Given in alternate years.

3 class hours; 1 discussion hour. Credit, 3.
Prerequisites, Spanish 25 and 26 or permission of the department.
Mr. Wexler.

84. (II) Prose and Poetry of the Golden Age (1957-58)

Intensive study of selected masterpieces of Spanish prose of the sixteenth and seventeenth centuries, excluding the Quijote; the development of Spanish poetry in the major poets from Garcilaso de la Vega to Gongora.

3 class hours. Credit, 3.
Prerequisites, Spanish 25 and 26 or permission of the department.
Mr. Greenfield.

85. (I) 86. (II) Cervantes (1958-59)

Intensive reading of *Don Quijote,* with collateral readings in other Cervantine works. The course is conducted in Spanish. Given in alternate years.

3 class hours; 1 discussion hour. Credit, 3.
Prerequisites, Spanish 25 and 26 or permission of the department.
Mr. Wexler.

RUSSIAN

Instructor in Language.

1. (I) 2. (II) Elementary Russian

Grammar, exercises in composition and conversation, selected readings. No credits in this course may be applied toward a degree until the close of the second semester, except upon special recommendation from the Provost.

3 class hours; 1 laboratory hour. Credit, 3.
Prerequisite, previous language training. Mr. Gregg.

5. (I) 6. (II) Intermediate Russian

A review of the fundamentals of grammar followed by more advanced study of grammatical structure and idiom. Composition, conversation, and readings in Russian fiction.

3 class hours; 1 laboratory hour. Credit, 3.
Prerequisites, Russian 1 and 2. Mr. Gregg.

SOCIOLOGY

PROFESSOR KORSON, PROFESSOR KING, ASSISTANT PROFESSOR DRIVER†, ASSISTANT PROFESSOR MANFREDI, MR. WILKINSON†, MR. YPSILANTIS, MR. LEVINE, MR. LINDENFELD, MR. SWARTZ.

25. (I) and (II) Introduction to Sociology

A study of the social order, and the individual considered as a member of his various groups.

3 class hours. Credit, 3.
THE DEPARTMENT.

26. (II) Principles of Sociology

A survey of the theoretical development of major sociological concepts with emphasis on American sociologists and their contributions. Reading and analysis of monographs utilizing the sociological frame of references for selected topics.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. MR. WILKINSON.

51. (I) Urban Sociology

A comparative study of modern social conditions, and methods of adjustment, with special reference to city environment. Characteristics of the population, urban ecology, and problems of adjustment in the fields of housing, health, education, and recreation are considered.

3 class hours. Credit, 3.
2:00-2:50 Tu. Th., third hour by arrangement. MR. MANFREDI.
Prerequisite, Sociology 25.

52. (II) Rural Sociology

A study of rural society from the standpoint of its population, institutions, standards of living, and their relation to urban society.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. MR. YPSILANTIS.

53. (I) Introductory Anthropology

An introduction to the principles of physical and cultural anthropology, including cross-cultural analyses of family systems, religion, economics, linguistics, and art.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. MR. WILKINSON.

54. (II) Advanced Anthropology

An examination of the development of anthropological theory of social organization as presented in the works of European and American anthropologists. A part of the semester is devoted to an intensive analysis of a specific cultural area.

3 class hours. Credit, 3.
Prerequisite, Sociology 53. MR. WILKINSON.

56. (II) Race Relations

The social, economic, and political aspects of racial problems in the United States, with particular reference to the Negro and major ethnic groups. A rabbi,

†On leave of absence.

minister, and priest are invited to address the class, and visits are made to the respective churches.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. Mr. Korson, Mr. Levine.

57. (I) The Family

The study of the development of the customs of courtship and marriage of the contemporary American family. The basic causes of changes and trends of the family are considered. Such topics as mate selection, marriage laws, marital prediction, husband-wife relations, and the role of the child are considered.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. Mr. King, Mr. Korson.

61. (I) Population Problems

A consideration of the physical and social factors which influence population change through births, deaths, and migration. Special emphasis is placed upon the population problems of underdeveloped areas in the world today.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. Mr. Wilkinson.

68. (II) Industrial Sociology

A study of the role, status, and function of the worker in the industrial community. A consideration of changing technology, resulting social change and the adjustments made in the industrial community.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. Mr. Korson.

72. (II) Social Change

Social change as it occurs through invention and acculturation; factors which influence the acceptance or rejection of concrete changes.

3 class hours. Credit, 3.
Prerequisites, Sociology 25 and permission of instructor. Mr. King.

75. (I) Social Problems

A consideration of the incidence, distribution and interrelations among the major types of social tensions in human societies. Various theories of causation are evaluated. In addition to regular classroom work, research projects and field trips are required.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. Mr. Driver.

78. (II) Criminology

A study of the nature of crimes and the factors underlying criminal behavior. Attention is also given to the machinery of justice in criminal behavior; the law, the courts, police enforcement, penal and correctional institutions.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. Mr. Driver.

82. (II) Sociological Theory

An examination of the contributions of European and American writers who have concerned themselves with theories of the origin, growth, and development of human social organization.

3 class hours. Credit, 3.
Prerequisite, Sociology 25. Mr. Manfredi.

92. (II) Introduction to Social Welfare

For senior majors and others who qualify. Contemporary problems of social concern: causes of poverty; methods of caring for adult and child dependents and defectives. A consideration of public and private agency administration and techniques, and an examination of federal, state, and local community programs.

3 class hours. Credit, 3.
Prerequisites, Sociology 25, 75. Mr. Ypsilantis.

93. (I) 94. (II) Seminar

Admission by permission of instructor. A study of the methods of research employed by social scientists. Students, under direction of the instructor, analyze and organize such sociological material as they gather through their own research. Projects must be approved in advance by the instructor.

Hours by arrangement. Credit, 3.
Mr. Driver.

SPEECH

Professor Niedeck, Assistant Professor Zaitz, Assistant Professor Peirce, Assistant Professor Savereid, Assistant Professor Harper, Miss Abramson†, Mrs. May, Mrs. Niedeck, Visiting Lecturer Sickles.

3. (I) and (II) Public Speaking

This course is designed to give the student introductory instruction and opportunity in oral self-expression and includes both public speaking and literary interpretation.

2 class hours. Credit, 2.
The Department.

THEATRE

71. (I) Scene Design and Construction

Theories and design in the modern theatre with assignments in developing stage settings from sketches to working drawing; from scenery construction to painting.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Peirce.

75. (I) Acting and Make-up

The course is roughly divided into ten weeks of study of emotion and imagination in acting, reading lines, rehearsing, diction, and bodily action; and five weeks of study and application of the principles of stage make-up.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Niedeck.

76. (II) Stage Direction

Study and practice in the fundamentals of directing a play. Recommended for those taking only one course in Drama.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Niedick.

†On leave of absence.

78. (II) Stage Lighting

Introduction to lighting a stage. Analysis of basic types of equipment and their application in artistic productions. Simple wiring and installations.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Peirce.

RHETORIC AND PUBLIC ADDRESS

91. (I) and (II) Extempore Speech

The theory and practice of public speaking for business and professional purposes.

3 class hours. Credit, 3.
Mr. Niedeck, Mr. Savereid.

92. (II) Discussion

Most of the semester is devoted to formal discussion: its organization and presentation. Students are given the opportunity to lead and to participate in discussions of current problems.

3 class hours. Credit, 3.
Prerequisite, Speech 91. Miss Abramson.

94. (II) Persuasion

Advanced study and practice in appeals to beliefs and action through extemporaneous speech.

3 class hours. Credit, 3.
Prerequisite, Speech 91. Mr. Zaitz.

ORAL INTERPRETATION

51. (I) and (II) Voice and Diction and Oral Interpretation

The course is divided into five weeks of training and drill in the correct production of speech, followed by ten weeks of practice in the fundamentals of vocal interpretation of literature. It is possible for a student to take the five weeks of voice and diction and receive one credit.

3 class hours. Credit, 1 or 3.
Mrs. May, Miss Abramson, Miss Sickles.

RADIO AND TELEVISION

61. (I) Fundamentals of Broadcasting

A general introduction to broadcasting: practice in preparing, rehearsing, and producing programs of various types.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Zaitz.

62. (II) Advanced Radio Production

An advanced course in broadcasting to provide practice in preparing and producing radio talks, radio plays and documentary programs.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Zaitz.

63. (I) Television Programming and Production

An exploration of the television medium for orientation in producing, directing and writing: network, local and educational operations both studio and remote.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Mr. Harper.

64. (II) Television Programming and Production

Practical television techniques from effective planning through effective execution by people off camera and on camera.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Speech 63. Mr. Harper.

65. (I) Writing for Television

A consideration of television writing methods for the successful production of all types of formats.

3 class hours. Credit, 3.
Miss Abramson.

66. (II) Film Production and Staging for Television

Preparation and execution of 16mm films for television: the course will prepare a 10-minute film project from the idea to editing, processing, screening and narration.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Speech 63. Mr. Niedeck.

VETERINARY SCIENCE

Professor Bullis, Professor Smith.

75. (I) Comparative Veterinary Anatomy

A study of the structure of vertebrates with emphasis upon the comparative structure of domesticated animals, both mammals and birds.

3 class hours. Credit, 3.
10:00-10:50 M. W. F. Mr. Smith.

76. (II) General Veterinary Pathology

An introduction to the study of disease—causes, transmission, structural changes, and defense mechanisms; and the application of these principles to the prevention, control, and eradication of the common communicable and non-communicable disease of farm animals.

3 class hours. Credit, 3.
11:00-11:50 M. W. F. Mr. Smith.
Prerequisite, Veterinary Science 75.

78. (II) General Veterinary Pathology

This course is similar to Veterinary Science 76 except that diseases of importance to wildlife, and diseases of animals transmissible to man will be considered.

3 class hours. Credit, 3.
9:00-9:50 M. W. F. Mr. Smith.
Prerequisites, Bacteriology 31, Zoology 35 or 71.

88. (II) Avian Pathology

This course is similar to Veterinary Science 76 but with application to specific communicable and non-communicable diseases of poultry.

3 class hours. Credit, 3.
8:00-8:50 M. W. F. Mr. Bullis.
Prerequisite, Veterinary Science 75.

ZOOLOGY

Professor Woodside, Professor Snedecor, Associate Professor, Bartlett, Associate Professor Rollason, Assistant Professor Traver, Assistant Professor Andrews, Assistant Professor Nutting, Assistant Professor Rauch, Assistant Professor Honigberg, Assistant Professor Swenson, Assistant Professor Roberts, Assistant Professor Snyder, Mr. Moner.

1. (I) and (II) Introductory Zoology

This course provides an introduction to the principles of biology, with special reference to the zoological aspects. The structure and activities of a representative vertebrate animal, the frog, are considered in detail and the knowledge thus gained is utilized in a comprehensive survey of the major groups of the animal kingdom. Brief introductions are given to the principles of classification, nutrition, structure, and functions of protoplasm, genetics, heredity, development, and evolution.

2 class hours; 1 3-hour laboratory period. Credit, 3.
The Department.

25. (I) Survey of the Animal Kingdom

Lectures emphasize those aspects of the zoological sciences which are least stressed in the introductory course; the principles of classification; ecology; economic importance; and the history of zoology in relation to man's progress. The laboratory work will include several exercises in field work; studies on representatives of phyla not covered previously; the morphological adaptations of animals to special modes of existence; and some simple zoological techniques.

2 class hours; 1 2-hour laboratory period. Credit, 3.
10:00-10:50 M. F.; 1:00-2:50 Tu. or W. or Th. Mr. Nutting.
Prerequisite, Zoology 1.

35. (I) and (II) Vertebrate Physiology

An introductory course which will include consideration of circulation, respiration, digestion, metabolism, excretion, chemical and nervous coordination, muscular activity, and reproduction. The laboratory work will acquaint the student with some of the equipment and methods used in physiological studies, with emphasis on the experimental approach to the laboratory exercises.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Mr. Snedecor, Mr. Swenson, Mr. Roberts.

37. (I) 38. (II) Anatomy and Physiology

An introduction to human anatomy and physiology with emphasis on the integration of normal structure and function. The subject matter will include skeletal, nervous, muscular, cardiovascular, respiratory, digestive, excretory, endocrine, and reproductive systems.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Zoology 1. Mr. Moner.

50. (II) Histology of the Vertebrates

A study of the types of tissues found in the body of vertebrate animals, and of the organs in which these tissues occur. Tissues and organs of mammals are emphasized. A knowledge of comparative anatomy is advised.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Zoology 1. Mr. Rollason.

51. (I) and (II) Microtechnique of Animal Tissues

The course comprises (1) a consideration of the principles and methods of microtechnique as applied to animal tissues, and (2) a series of practical exercises in the preparation of animal tissues for microscopic examination. Registration is limited to 12 students per semester. Consult instructor for section assignments.

2 2-hour laboratory periods. Credit, 2.
Prerequisite, Zoology 1. Mr. Honigberg.

53. (I) Principles of Genetics

Lectures and laboratory experiments concerning the laws governing the transmission of hereditary factors in plants and animals, expression and action of genes, population genetics, and the relationship of genetics to other biological sciences.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Zoology 1. Mr. Rauch.

54. (II) Natural History—Physical

Designed to orient students to the features of sky, climate and terrain which are of prime importance to the teaching naturalist. Collection, recording, preservation, and the use of natural objects will be stressed. Biological data will also be obtained as the season dictates.

1 class hour; 1 4-hour laboratory period. Credit, 3.
Prerequisites, Botany 1; Zoology 1. Mr. Nutting.

55. (I) Natural History—Biotic

An extension of Zoology 54 with emphasis upon the fauna and flora. This course is primarily concerned with the development, local distribution, responses, and interrelationships of these organisms. Their position with respect to the physical environment will be discussed in some detail.

1 class hour; 1 4-hour laboratory period. Credit, 3.
Prerequisites, Botany 26; Geology 27; Zoology 54. Mr. Nutting.

56. (II) Natural History—Field Studies

A program of extensive field work growing out of preparation in Zoology 54 and 55. Emphasis upon seasonal differences in abundance and stage of development of our fauna and flora.

1 class hour; 1 2-hour laboratory period. Credit, 2.
Prerequisites, Zoology 55 and permission of instructor. Mr. Nutting.

64. (II) Biology of Protozoa (1958-59)

An introduction to the morphology, systematics, physiology, and ecology of protozoa with a consideratin of the contributions to the problems of biology made through the study of these organisms. Given in alternate years.

1 class hour; 1 2-hour and 1 3-hour laboratory period. Credit, 3.
Prerequisites, Zoology 1 and permission of the instructor. Mr. Honigberg.

ZOOLOGY

69. (I) Animal Parasitology

Representative protozoan and helminthic parasites of man and domestic animals are studied, with special reference to their morphology and life cycles. Emphasis is placed upon parasitism as a mode of life; on hostparasite relationships; on vectors, and other modes of transmission; and on methods of control of certain of the more important human parasites.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisite, Zoology 1. Miss Traver.

70. (II) Invertebrate Zoology (1958-59)

A survey of the phyla of invertebrate animals from evolutionary and phlogenetic aspects. Morphology, modes of nutrition and reproduction, interrelationships with other animals, and distributions in time and space, are considered, as well as classification. For each phylum, representatives of the principal classes are studied. Marine, terrestrial and freshwater forms are included. Given in alternate years.

1 class hour; 2 3-hour laboratroy periods. Credit, 3.
Prerequisite, Zoology 1. Miss Traver.

71. (I) Comparative Vertebrate Anatomy

A thorough study of the anatomy of the vertebrates, with emphasis on the evolution, special modifications, and functional interrelationships of each of the organ systems. A systemic approach is used. Animals studied in the laboratory are: protochordates, lamprey, dogfish, mudpuppy, and cat.

2 class hours; 2 3-hour laboratory periods. Credit, 4.
Prerequisite, Zoology 1. Mr. Bartlett, Mr. Snyder.

72. (II) Vertebrate Embryology

Lectures and laboratory work dealing with the development of representative animals, special emphasis being placed on the amphibian, bird and mammal.

2 class hours; 2 3-hour laboratory periods. Credit, 4.
Prerequisite, Zoology 71. Mr. Woodside, Mr. Rauch, Mr. Bartlett.

74. (II) Limnology (1957-58)

The study of inland waters, emphasizing the geological, physical, chemical and biological aspects of this problem. Standard methods for making physical and chemical tests and measurements, and for the collection of biological materials, are used by students in the numerous field trips. Biological material collected in the field is studied in the laboratory. Given in alternate years.

2 class hours; 2 3-hour laboratory periods. Credit, 4.
Miss Traver.
in cooperation with the departments of Botany, Entomology, Geology, Public Health, and Zoology.
Prerequisites, Botany 1; Zoology 1; Chemistry 1, 2; and permission to register. Strongly recommended: Botany 25, 26; Entomology 26; Zoology 25; Geology 27, 28; Chemistry 29, 30.

78. (II) Genetics of Animal Populations (1957-58)

The principles of the genetics of animal populations with emphasis upon its basic techniques and methods, its goals and contributions. The population

approach to the study of the origin of species and human genetics will be considered also. Given in alternate years. Enrolment is limited to ten.

1 2-hour lecture-discussion period per week; Credit, 2.
Prerequisites, Zoology 53 or its equivalent and permission of the instructor.
Mr. Rauch.

80. (II) Ornithology

An introduction to the study of avian biology with emphasis on structural and functional adaptations, and particularly the behavioral patterns of birds. Laboratory periods include discussions of assigned readings in current literature in addition to field trips for identification and methods of field study.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Zoology 1. Mr. Bartlett, Mr. Nutting.

81. (I) Vertebrate Zoology

An introduction to the vertebrates, their classification and ecology, with particular emphasis on the fishes. Field trips for the study of local fauna will be included as a part of the laboratory exercises. Course limited to eighteen students.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Prerequisite, Zoology 1. Mr. Andrews, Mr. Bartlett.

82. (II) Mammalogy (1958-59)

An introduction to the mammals, their evolution, distribution, classification, and natural history. A study of the local fauna with two or three field trips required. Enrolment limited to fifteen students. Given in alternate years.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisites, Zoology 1 and permission of instructor. Mr. Snyder.

83. (I) General and Cellular Physiology

A course designed to introduce the student to modern trends in physiology. Emphasis is on the chemical and physical activities of the single cell. Topics include: protoplasmic organization, cellular metabolism, permeability, bioelectric phenomena, muscle contraction and radiation biology.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, 1 year of biology; organic chemistry. Mr. Swenson.

84. (II) Comparative Physiology

A course designed to acquaint students with physiological principles involved in adaptations of animals to their environments. In the laboratory, experimental methods used to study adaptive mechanisms will be emphasized.

3 class hours; 1 3-hour laboratory period. Credit, 4.
Prerequisites, Zoology 1, 35 or 83. Mr. Roberts.

85. (I) Classes of Arthropods Other Than Insects

Arthropods are studied from the phylogenetic standpoint, with special reference to their relationship to the origin and evolution of insects.

1 class hour; 2 2-hour laboratory periods. Credit, 3.
Mr. Hanson.

86. (II) Fishery Biology

Theory in the practice of regulating freshwater fisheries; the physical and biological conditions of the environment and their influence on fish populations.

2 class hours; 1 2-hour laboratory period. Credit, 3.
Prerequisite, Zoology 81 and permission of instructor. Mr. Andrews.

ZOOLOGY

87. (I) Endocrinology

Emphasis will be directed toward the importance of the endocrines in their control over normal functions (growth, metabolism, reproduction, etc.), in a variety of animals.

2 class hours; 1 3-hour laboratory period. Credit, 3.
Prerequisite, Zoology 1. Mr. Snedecor.

91. (I) 92. (II) Special Problems in Zoology

Qualified seniors who have met departmental requirements for specialization in the field of zoology may arrange for work on a special problem in zoology.

Credit, 1-3.
The Department.

Invertebrate Zoology, Marine Biological Laboratory, Woods Hole, Massachusetts. Credit, 3.

Invertebrate Embryology, Marine Biological Laboratory, Woods Hole, Massachusetts. Credit, 3.

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UNIVERSITY OF MASSACHUSETTS ENROLLMENT — September, 1957

UNDERGRADUATE COLLEGE

	1958		1959		1960		1961		Total		
Class	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Total
Arts and Sciences	207	127	202	157	240	219	245	362	894	865	1,759
Education	0	50	2	39	0	50	2	88	4	227	231
Engineering	194	2	207	0	252	3	305	4	958	9	967
Business Administration	123	4	120	9	119	10	103	13	465	36	501
Agriculture	63	5	76	6	61	2	52	3	252	16	268
Home Economics	0	28	0	26	0	33	0	45	0	132	132
Physical Education	23	0	18	0	13	0	23	0	77	0	77
Nursing	0	4	0	17	0	14	0	21	0	56	56
Total	610	220	625	254	685	331	730	536	2,650	1,341	3,991
Total by Classes	830		879		1,016		1,266		3,991		
Specials									11	28	39

GRADUATE SCHOOL

Men	Women	Total
308	122	430

STOCKBRIDGE SCHOOL

	1958	1959	Total
Men	148	175	323
Women	3	4	7
			330
Special			1
			331

SUMMARY

Undergraduate School	4,030
Graduate School	430
Stockbridge School	331
Grand Total	4,791

GIFTS AND BEQUESTS

For the information of those who may wish to make a gift or a bequest to this University, the following suggestion is made as to a suitable form which may be used.

There are a number of worth-while activities of the University which are handicapped by lack of funds and for which small endowments would make possible a greater measure of service to our students and to the Commonwealth. The religious work on the Campus is an example. This is now carried on in a very limited way by current private contributions. Further information concerning this and other activities in similar need will be gladly furnished by the President.

SUGGESTED FORM

"I give and bequeath to the Trustees of the University of Massachusetts, at Amherst, Massachusetts, the sum of .... dollars."

(1) (Unrestricted)

"To be used for the benefit of the University of Massachusetts in such manner as the Trustees thereof may direct."

or (2) (Permanent Fund: income unrestricted)

"to constitute an endowment fund to be known as the .... Fund, such fund to be kept invested by the Trustees of the University of Massachusetts and the income used for the benefit of the University in such manner as the Trustees thereof may direct."

or (3) (Specific Purposes)

"to be used for the following purposes,"

(Here specify in detail the purposes.)

Correspondence regarding various phases of the University program should be directed as follows:

Academic Affairs
SHANNON MCCUNE, *Provost*

Admission and Registration
MARSHALL O. LANPHEAR, *Registrar*

Expenses, Payments
AVERY BARRETT, *Cashier*

Extra-Curricular Activities
WILLIAM D. SCOTT, *Director, Student Union*

Graduate School
GILBERT WOODSIDE, *Dean*

Housing
HERBERT RANDOLPH, *Housing Supervisor*

Loans
EMORY GRAYSON, *Director of Placement*

Men's Affairs
ROBERT S. HOPKINS, *Dean of Men*

Publications, News
MARJORIE L. HARTHAN, *Director of Publications and News Editor*

Scholarships
FRED JEFFREY, *Associate Dean of the College of Agriculture*

Short Courses
FRED JEFFREY

Stockbridge School of Agriculture
FRED JEFFREY

Student Employment
EMORY E. GRAYSON, *Director of Placement*
CAROL BURR CORNISH, *Placement Officer for Women*
ROBERT J. MORRISSEY, *Placement Officer for Men*

Summer Sessions
SHANNON MCCUNE, *Provost*

Transcript of Records, Registrar

Veterans' Affairs
GEORGE EMERY, *Veterans' Coordinator*

Women's Affairs
HELEN CURTIS, *Dean of Women*

UNIVERSITY OF MASSACHUSETTS
AMHERST 1863

Principles and Practice

ANNUAL REPORT OF THE PRESIDENT—1957

UNIVERSITY OF MASSACHUSETTS

UNIVERSITY OF MASSACHUSETTS BULLETIN

VOLUME L APRIL, 1958 NUMBER 3

Published four times a year by the University of Massachusetts: February, March, April and November. Second class mail privileges authorized at Amherst, Mass.

The report of the President for the year ending January 1, 1958, is part of the 95th annual report of the University of Massachusetts, and as such is Part I of Public Document 31. (Section 8, Chapter 75, of the General Laws of Massachusetts.)

THE COMMONWEALTH OF MASSACHUSETTS

UNIVERSITY OF MASSACHUSETTS

AMHERST

OFFICE OF THE PRESIDENT

The Honorable Joseph W. Bartlett
Chairman, Board of Trustees
The University of Massachusetts

Dear Doctor Bartlett:

It is my privilege to present to you, to the Board of Trustees, and to the Governor and Citizens of the Commonwealth this report for the University of Massachusetts covering the year January 1, 1957 to January 1, 1958.

Respectfully yours,

Jean Paul Mather

Jean Paul Mather,
President

February 20, 1958

PRINCIPLE
as well as
PRACTICE

This annual report is divided between a thumbnail sketch of what happened of significance at the University of Massachusetts during 1957 and an inquiry into the nature of things after the happening.

PRACTICE — what happened

A generous and farsighted General Court, recognizing the need in the Commonwealth for extending public higher educational opportunities, appropriated record funds for operating the University and for expanding the physical facilities.

Adding $5,150,000 in capital outlay brought total appropriations during the four years past, for planning and construction of new buildings and facilities, to $17,170,329. This amount is twice the accumulated total of all capital outlay funds *at cost* appropriated in the 91-year history of the University prior to 1954.

During 1957, Federal grants of $200,000 for research facilities in the Science Center, $155,000 for research laboratories in the Liberal Arts Building, and $4,375 for Chemistry research equipment provided much needed material assets beyond state appropriations.

The operating budget totaled $7,852,670, of which 74% or $5.8 million is for salaries of staff. The other operating appropriations — including books, repairs, maintenance, educational supplies, equipment, etc. — amounted to just under $2,000,000 or about $175,000 *less than* the total revenues which the University returns to the General Fund from the collection of tuition, rents, fees, and prices of goods and services produced and sold.

Completion of the Student Union, financed by an annual student fee, put this significant recreation and activities center into operation February 1, 1957. In addition to the student programs and services provided, the Union brought under centralized management the University Store, the snack bars, and the Recognized Student Organizations' administration.

Beyond these significant financial statistics, there were important changes and advances in the program and work of the people of the University. In the interest of economy, efficiency, and improved service to the Commonwealth, the Entomology Department and the Plant Pathology Section of the Botany Department were transferred from the College of Arts and Sciences to the College of Agriculture. Joining with similar programs already in agriculture, the transfer established a single, new Department of Entomology and Plant Pathology. At the same time the former departments of Floriculture, Olericulture, and Pomology were combined into a Department of Horticulture in the College of Agriculture. These organizational changes will produce reductions in research and institutional costs from both state and federal funds. Duplicated jobs and efforts will be eliminated, total numbers of positions needed will be reduced in rank and number, and the resulting integration of programs should prove of benefit to agriculture and the taxpayer as well as to the University.

Application of Freedom Bill policy, after three years of search, made possible the restaffing of the Physics Department under the new leadership of nuclear scientist Dr. John D. Trimmer. The same policy applied to Agricultural Engineering brought Dr. Robert Kleis as the new Head of Department with additional competent staff.

A trust fund contract, negotiated with General Electric Transformer Division in Pittsfield, Massachusetts, through the School of Engineering started a branch engineering program in Pittsfield in September 1957. Thirty G. E. employees and fifty-seven other students on a fee basis enrolled. Costs of the program are paid by the General Electric Company and fees from other students. The program is self-supporting and represents a significant step in cooperation between a private corporation, a public university, and the local community — providing additional engineering educational opportunities for these critical times.

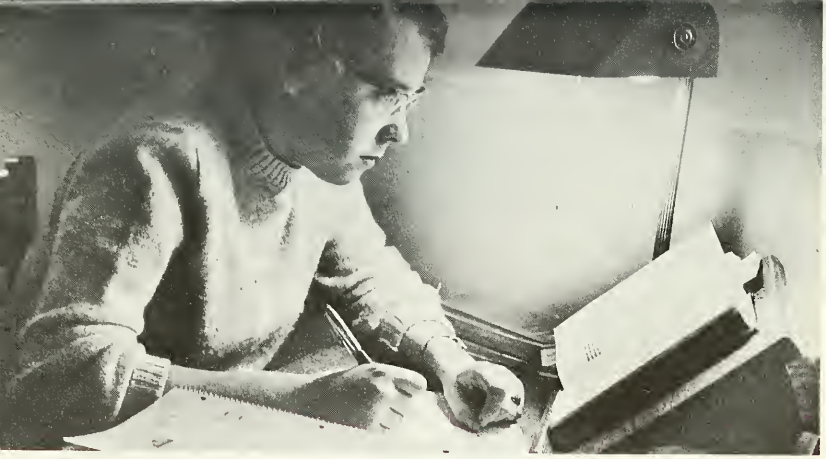
After a year of negotiation and planning, a final contract was negotiated with the International Cooperation Administration of the U. S. Department of State and Hokkaido University, Sapporo, Japan, for exchange of faculty in an education and training program. The program will be financed with I.C.A. funds without cost to the Commonwealth. President Harusada Suginome of Hokkaido

University and three of his staff visited in Amherst for over a month during the fall semester. Planning was completed for the exchange of personnel over a three-year period starting early in 1958.

This marked the second year of the Carnegie Language Project. Study and planning under this grant will insure a modern language laboratory, current in equipment and technique, for the new Liberal Arts building to be constructed during the coming year.

During the summer of 1957, under a $54,000 grant from the National Science Foundation, Professor Robert Wagner of the Department of Mathematics directed a very successful institute for upgrading and advancing the teaching of high school mathematics.

After nearly two years of planning and a careful review of related policy by the Board of Trustees, the Faculty Senate was organized. With an elected faculty membership, this body will serve as the representative legislative group for educational policy. Such organization provides a medium for fully discussing the evolving program of the University through a policy-making group with greater flexibility than the total faculty. This enables the



administration to use the monthly meeting of the entire faculty as a forum for communication and information.

Publications of the Bureau of Government Research under the able direction of Dr. John Gillespie demonstrated the positive contribution of research by this important part of the University family toward the solution of problems of state and local government. The second annual school for assessors conducted by the Bureau was much larger than the first and received high praise from all participants.

Two important studies continued through the year should eventually result in improved policies.

The report of the *ad hoc* committee on Outside Consulting and Research Activities, still under review by the Faculty Senate, should eventually provide a clear and complete policy framework for faculty contract activities beyond regular classroom instruction and personal research. The College of Arts and Sciences continues to review the entire general education concept. The ultimate goal is revision of the curriculum toward student requirements in a modern society within the complex of the general and specialized departments, divisions, schools, and colleges of a university.

A heartening increase in both enrollment and graduation for the School of Education demonstrates the effort of the University toward relieving the continuing and increasing shortage of qualified elementary and secondary school teachers.

So much for *PRACTICE.*

This part of the report admittedly covers only the highlights of the year's work. Extensive reports from the Schools and Divisions of the University, filed with proper authorities, give a more detailed picture of the aims and efforts of a loyal and conscientious staff in behalf of a vigorous and able student body.

PRINCIPLE — the "why" of what happens

In this section of the annual report I will raise some questions asking *why* we do or have done some of the things we practice. The spirit of these questions is not meant to be quarrelsome, or personalized in any way, or hypercritical, or even querulous. But where there is responsibility for accounting for the material debits and credits of a social institution (as the PRACTICE section of this report does), I believe there is an even greater responsibility for asking and answering the *why* questions. Just as higher education should provide young people with the ability to reason, think, and question *why*, so those responsible for the process should always be asking questions as well as providing answers about methods and facts — the *how* and *what* of our lives and livings. We must maintain a constant critique on quality if the quantity accomplishments are to mean anything.

The academic performance synonym for quality is the much used and abused word "standards," usually preceded by such high-sounding modifiers as "high," "excellent," "best," or "improved." I have yet to talk with any thoughtful educational administrator, however, who does not recognize that, when you speak of the "quality" or "standards" of a university, you refer to a complex of admissions, grading norms, quality of staff, facilities (including buildings *and* equipment), student attitudes, communication of administrative policies, and other tangible and intangible criteria just as difficult of continuous and objective evaluation.

It is conceivable that as an extreme policy any state might appropriate enough tax money to provide *public* higher educational opportunity for *all*

qualified high school graduates desiring a college education, but *not* admitted to private institutions in the state or private and public institutions outside the state. Some state universities in the Midwest and Far West approach this extreme, particularly where private colleges and universities are scarce or non-existent. Such an extreme compares, as an idea, with the concept of public elementary and secondary education long prevalent in the United States. And such an extreme, *in terms of abilities and performance potential*, would accept many more students from the annually growing pool of college applicants than present restrictive and selective admissions requirements.

But the University of Massachusetts is farther away from this ideal extreme in New England as well as the United States than any other state university. Why?

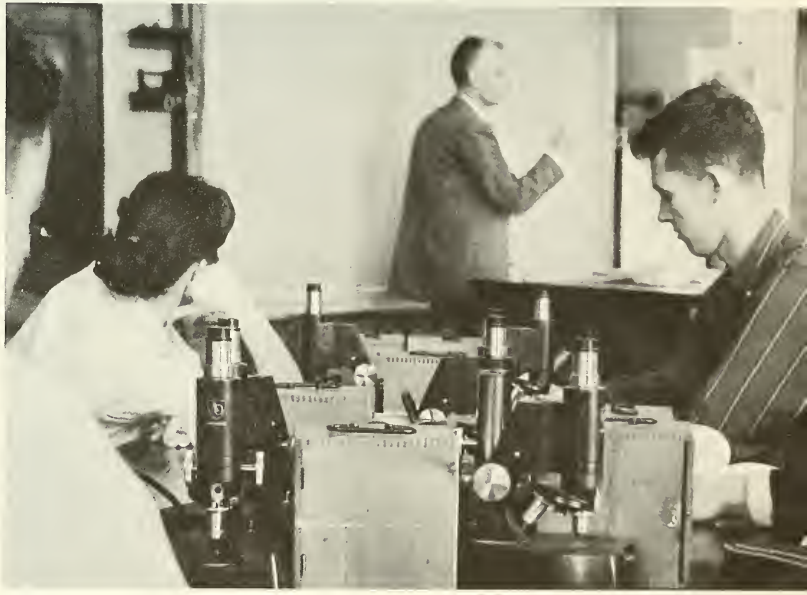
And in terms of *quality* as well as quantity, what should we do about it? We face greater relative pressures for admission, even if we reach our target of 10,000 students by 1965, than other state universities. This is true simply because we began to develop and expand *later* than other public universities. And as the private colleges and universities of Massachusetts preserve their national character for endowment, and their national and international character for admissions, the college age population of the state increases by over 50% of the present base. Excepting only the large metropolitan universities and colleges in Boston, the preponderant enrollment in the entire remaining group of slightly expanded private universities and colleges will continue to come from *outside the state*. Year by year other states are reducing and restricting, by legislative or trustee mandate, the acceptance of out-of-state applicants. These mandates will further shrink opportunities for Massachusetts high school graduates and drive more and more of them at least to the application line at the University of Massachusetts. Short of some type of miraculous fiscal "break-through" or "crash program," I submit that we have no other choice, *in terms of what is still gradual annual progress*, than to become more selective and objective in our admissions process. Last year's annual report made much of the broad geographical distribution of students then enrolled. In retrospect, the only real significance was that 58% came from Worcester and east — where the bulk of the population ac-

tually lives. If the tax resources made available in the future continue in their present ratio to the *increasing* number of applicants, we have no other choice than to take the *best* applicants, regardless of geography, and even if they come *preponderantly* from one or a few large metropolitan centers. *There is nothing sacred about "ruralism" or "broad distributions" if the resources available are limited relative to the numbers that apply.* We haven't time, money, or people enough to evaluate or educate a great mass of high school graduates, low in either ability or motivation or both, in the maudlin hope of selecting enough to develop a "well-rounded-out" campus with country club characteristics ranging from greenskeepers to professionals. I believe we should use every professionally developed objective admission criterion available. I believe we should require at least the College Entrance Aptitude Tests of *all* applicants considered, as an additional criterion to be correlated with total high school performance and the recommendations of high school principals, superintendents, and guidance counselors. Time spent by our admission officers on such correlation evaluations plus *extended* travel contacts with high school administrators, would, I believe, be worth twice as much as time now spent on campus interviewing applicants. I believe that we cannot afford to turn down students with *better* total performance records from large urban high schools in favor of graduates of small high schools just to preserve an admissions or campus atmosphere of ruralism or broad geographical distribution. This recognizes of course that, if *all* criteria are included, the exceptional student in the small school will receive just consideration. And we can do no better service to the cause of awakening young people to the necessity for effort and accomplishment early in their high school careers than to pass the word that the State University is getting tougher and tougher at the admissions line.

Once students are admitted, I believe there is room for inquiry about the norms or standards established by the grading process and the resultant flunk rate. The Class of 1958 is the first to graduate under the Quality Point System which, with only minor variations in point interpretations, has become practically unanimous in usage by colleges and universities throughout the country. Theoretically it is supposed to establish the principle that all who graduate shall accomplish at least an

average performance for the total four-year program. By letting the student know throughout his enrollment where he stands, it is assumed that he will work hard to raise his quality point average by better successive semester or quarter records whenever he slips below the average or approaches the "flunk out" quality point minimum. During the first four years of application of the system at the University, I think we have not been tough enough in its application. And consequently I do not believe the student body at present respects the principle, the method, or the quality objectives of the system.

Recent statistical studies, presented by the Provost at monthly faculty meetings, show a relatively "normal" distribution curve for all grades administered in a semester — skewed if at all toward the left, or giving a better break above the "C" average required for graduation. But these total University figures aren't significant. We cannot assume that the number of flunkees per semester in a growing student body should be kept relatively constant. I believe it is an obligation to the taxpayer as well as the educational world to drop poor performers. I endorse the courage and the wisdom of the President of the University of Delaware who reports in his last annual message the "academic" failure of twice as many students from an under-



PRACTICE

graduate student body less than half the size of ours.

Such courage and wisdom, however, should be accompanied here by extended analysis of our ac-

tions rather than snap judgments. Our problem seems to me to lie in variations between scattered departments of the schools, colleges, and divisions

PERFORMANCE

in norms back of grading. Can it be that objectives occasionally are geared to failing students, rather than to teaching them? Is it possible that norms are set sometimes above either the selectivity or ability levels of the best student body we can assemble out of *a majority of publicly educated high school graduates from the single state of Massachusetts?* Of course the problems of admission and performance are all of a piece. More selective admissions should mean better performance. But after fifteen years as a lecturing professor, I still believe that the responsible teacher should never be freed of the introspective query, "Am I always teaching to advance each student in my class as far as *he* can possibly go through *my* daily performance?" And at the same time, "Am I expecting a norm of impossible attainment for even the best, let alone the average student in my classes?" No one proposes an homogenized student society of average or less than average performance from such inquiry, any more than we should propose general norms based on the performance of geniuses. An *ad hoc* faculty committee has been appointed to review the entire University grading process and report recommendations and conclusions for consideration of the Faculty Senate during the coming year. I await with interest these considerations.

Why does the present administration consist-

University of Massachusetts Enrollment — September 1957

UNDERGRADUATE COLLEGE

Class	1958 Men	1958 Women	1959 Men	1959 Women	1960 Men	1960 Women	1961 Men	1961 Women	Total Men	Total Women	Total
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Physical Education	23	0	18	0	13	0	23	0	77	0	77
Nursing	0	4	0	17	0	14	0	21	0	56	56
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Total by Classes	830		897		1016		1266		3991		
Specials									11	28	39

GRADUATE SCHOOL

Men	Women	Total
308	122	430

STOCKBRIDGE SCHOOL

	1958	1959	Total
Men	148	175	323
Women	3	4	7
			330
Special			1
			331

SUMMARY

Undergraduate School	4030
Graduate School	430
Stockbridge School	331
Grand Total	4791

ently and publicly question the system of commission and bureaucratic controls over our operations, *beyond the express statutes and mandates of the legislature?* This question is often asked of the President with the repeated and wearisome advice of many, "Why don't you just relax, recognize that you're in Massachusetts where things are different, and accept things as they are?" My answer, as a matter of *principle*, is that I have one undivided and continuous loyalty. That loyalty, come what may, is to the educational welfare of the student body. When processes or methods are made more significant than results; or when processes or methods hamper or reduce the accomplishment of results — in principle one should resist. And in principle we should be held accountable far more for *results* than for *methods*.

A nationally recognized educator and administrator has put the matter very succinctly. I call in quote here on his wisdom and ability. . .

> "Higher education deserves and should have a highly autonomous status in the governmental organization of which it is a part, be it state or municipal or federal. In brief the reasons are its difference in objective, its breadth of public responsibility, the nature of its management, its professional and technical quality, and its non-political character, most of which are more or less in contrast to most other departments of government. Almost all states leave to boards of trustees full authority over all matters relating to academic and professional personnel. Most states require a more or less complete personnel reporting in connection with the budget but leave final determination to the boards *after the appropriation is made*. No right-minded person expects to be free from accountability or to have the 'money put in the bank' for use with no accounting required. But when the state creates an agency like a board of trustees and the legislature makes appropriations to it after detailed examination of its budget, why set up additional day-to-day checks by fiscal employees? Controls, even though assigned to top officials, are actually frequently exercised by subordinates of clerical rather than executive responsibility. Legislatures probably have been led into establishment of such checks on the plea that money

can be saved. Such a point of view overlooks the fact that members of boards of higher education are just as responsible and just as honest as state administrative officials, that they are just as interested in economy as any state official, that they and not the latter are charged with the responsibilities of management, and that with responsibility must go authority, plus accountability, of course."[1]

It was in the spirit and letter of this quote that the University sought and obtained legislative approval of the Freedom Bill covering professional personnel policies in 1956. It is the continuing spirit of our work in admissions, in hiring, and in teaching. It will always result in additional questions, requests for remedial legislation, and public reviews of commission or bureau rules and regulations, *whenever the quality of education* is threatened, hampered, or impaired. It is the job of public education as well as private education to reserve a sanctified place for development and exploration of the ideas of men. That sanctity is violated whenever any compromise of expediency, great or small, is made in the policies of an educational institution. And I am sure the taxpayers, interested in the educational welfare of their sons and daughters, will support in dollars as well as principle such a concept.

It seems so obvious to me as to be unnecessary of reiteration that a tax supported public university, in these complex and competititve times, must be discriminating in the establishment of its standards of admission, performance, and operation in the best interests of *efficiency with quality*. But at the same time it *cannot* be discriminatory on the basis of party affiliation, religious belief, residence, nationality, or creed. People are to be admitted and people are to be hired (from janitors to full professors) on the basis *only* of their professional competence or capacity, and their personal character. Any other principle for the University is to me intellectual dishonesty and moral incompetence. Trustee policy of June 1957 will admit five per cent of each entering class from outside the Commmonwealth. This is but a small gesture toward non-provincialism as well as reciprocation for the many Massachusetts students

[1] May 2, 1955. Dr. Lloyd Morey (President of University of Illinois), National Association of State Universities. *"Governmental Control of Public Higher Education."*

educated in other state universities at their tax expense. In spirit, after a three-year period of admitting only resident undergraduates, this policy represents a discriminating interpretation of quality *without* being discriminatory in principle. Able students as well as able faculty, the "idea people" of tomorrow, are not confined within state, or county, or election district boundaries.

In reading one of the annual reports submitted by Deans and Division Heads another question of principle was raised. In essence the question was, "Should we practice a kind of intellectual isolationism by an excessive insistence on teaching alone as our primary function? Why shouldn't research be pushed and developed as the foundation for better teaching as well as recognized scholarship?" The point is well taken. Although the amount received as private and government grants for fellowships and research has increased from around $80,000 in 1953 to $279,000 during the past year, this total is insignificant in relation to the pool of latent capacities inherent in the total faculty. In addition to specialized contract research there is a very real need for additional basic research. It is absolutely fundamental to the development of a great university that additional funds, *including line appropriations* of state funds, be made available in the future for both basic and applied research. History shows that dollars spent for "know-how" in other state university budgets have always returned many-fold in economic, scientific, and social benefits to the spending state. We are making progress with "outside" funds. Better and faster progress should be forthcoming in both state and agency expenditures.

The questions raised in this report are but a few of the most pressing of the problems that plague us. I raise them now, with faith and optimism that they can be solved and that all of us will work toward their solution. For I am humbly conscious of the great and good work of the years and the people of this University. Here is a priceless institution of community. Common hopes and aspirations of common people have, for nearly a century, made this campus an honest, reputable, and decent place of scholarship and study. Dedicated, as are all the great land grant colleges and universities, to providing educational opportunity for able youth of limited means — the University of Massachusetts has developed the greatest single

asset of the Commonwealth — young people.

There is no spiritual task of greater moment than that of shaping the intellectual character of young men and young women. Just as it is intellect that distinguishes man from beast so the very moral fiber of a society is a reflection of how men think on all things. And university is organized that all those of it are best engaged when searching ever and forever for the universe that is truth. This search becomes the wisdom of the ages when it moves always to translate the curiosity of man into progress, *not* dictated by selfish or expedient ends.

It is a piteous thing to be
Enlisted in no cause at all,
Unsworn to any heraldry;
To fly no banner from the wall,
Own nothing you would sweat or try for,
Or bruise your hands or bleed or die for.

To take the smooth and middle path,
The half-heart interest, the creed
Without extreme or hope or wrath,
Ah, this were heresy indeed
That all God's pity will not stay for,
And your immortal soul will pay for.

APATHY by *Sara Henderson Hay**

Jean Paul Mather,
President

**(With appreciation to the University of Massachusetts* Collegian, *student newspaper.)*

Personnel Changes

JANUARY 1 — DECEMBER 31, 1957

FACULTY

Deaths:

George H. Lyttle, *Assistant Professor of Electrical Engineering*
Richard E. Pride, *Associate Professor, Waltham*

Retirements:

Ralph W. Donaldson, *Extension Professor of Agronomy*
Edward D. Emerson, *Assistant Professor of Mechanical Engineering*
John N. Everson, *Assistant Professor of Agronomy*
Carl R. Fellers, *Professor and Head of Department of Food Technology*
Harley A. Leland, *Extension Professor of Youth Work*
Miner J. Markuson, *Associate Professor of Agricultural Engineering*
Earle H. Nodine, *Associate Professor of Youth Work*
Robert B. Parmenter, *Extension Professor of Forestry*
Wallace F. Powers, *Head of Department of Physics*
Clark L. Thayer, *Professor and Head of Department of Floriculture*

Promotions:

To Head of Department:

Theodore C. Caldwell, *History*
William B. Esselen, *Food Technology*

To Professor:

Robert T. Curran, *Physical Education*
John H. Dittfach, *Mechanical Engineering*
J. Harry Rich, *Forestry*
William E. Tomlinson, Jr., *Cranberry Station*

To Associate Professor:

John W. Anderson, *Accounting*
Dorothy Davis, *Home Economics*
Robert W. Day, *Mechanical Engineering*
Seymour Epstein, *Psychology*
Tsuan Hus Feng, *Civil Engineering*
Thomas Grow, *Civil Engineering*
Lawrence C. Hackamack, *Business Administration*
Robert B. Johnson, *Romance Languages*
G. Stanley Koehler, *English*
Helen O'Leary, *Education*
Eliot C. Roberts, *Agronomy*
Sargent Russell, *Agricultural Economics*
L. Lawrence Taylor, *to Controller*
Robert L. Ticknor, *Landscape Architecture, Waltham*
Jay R. Traver, *Zoology*
John W. Zahradnik, *Agricultural Engineering*

To Assistant Professor:
Herschel G. Abbott, *Forestry*
Gerard Braunthal, *Government*
Richard H. Brown, *History*
Edward L. Davis, *Botany*
Gellestrina T. DiMaggio, *Nursing*
Mrs. Katherine L. Esselen, *Home Economics* (½ time)
Sumner M. Greenfield, *Romance Languages*
Richard D. Harper, *Speech*
Alexander Hull, Jr., *French*
Alex R. Page, *English*
Robert A. Potash, *History*
Mrs. Emily Thies, *Home Economics*

Appointments:
Richard A. Gregg, *Visiting Lecturer in Russian* (½ time)
John B. Halsted, *Visiting Lecturer in History* (⅓ time)
Rudolph H. Kyler, *Visiting Lecturer in Business Administration*
Edwin C. Rozwenc, *Visiting Lecturer in History* (⅓ time)
John L. Teall, *Visiting Lecturer in History* (⅓ time)

To Head of Department:
Robert W. Kleis, *Agricultural Engineering*
John D. Trimmer, *Physics*

To Dean of School of Business Administration:
Himy B. Kirshen

To Assistant University Librarian:
Irene M. Kavanaugh

To Associate Executive Director of Associate Alumni:
Francis D. Driscoll

To Foods Manager of Student Union:
Edward A. Buck

To Professor:
Joseph D. Burroughs, *Home Economics* (*Human Relations*)
Robert J. Doolan, *Engineering* (*Director of G. E. Pittsfield Program*)
Philip Rosen, *Physics*

To Associate Professor:
Paul D. Agarwal, *Electrical Engineering*
Albert S. Anthony, *Education*
Warren Averill, *Food Technology*
Joe Todd Clayton, *Agricultural Engineering*
Oswald C. Farquhar, *Geology*
Curtis A. Johnson, *Agricultural Engineering*
Theodore W. Leed, *Agricultural Economics*
Rudolf Mathias Schuster, *Home Economics*
John H. Noyes, *Forestry*
Barbara R. Snowman, *Home Economics*
Warren M. Teichner, *Psychology*
Harriet J. Wright, *Home Economics*

To Assistant Professor:

David C. Bischoff, *Physical Education*
Ernest M. Buck, *Dairy & Animal Science*
Bruce W. Calnek, *Veterinary Science*
David J. Dickinson, *Mathematics*
Katharine S. Duroe, *Home Economics*
Paul Eck, *Floriculture, Waltham*
John H. Foster, *Agricultural Economics*
Edwin A. Gere, Jr., *Bureau of Government Research*
Robert A. Gessert, *Electrical Engineering*
Edwin W. Hanczaryk, *Home Economics*
Charles A. Herald, *Electrical Engineering*
Carlton E. Hunter, *Mechanical Engineering*
Klaus E. Kroner, *Mechanical Engineering*
Elmer Lawson, *Education*
Marjorie M. Merchant, *Home Economics*
Roger A. Morse, *Horticulture*
Margaret J. Mosher, *4-H Club*
John S. Norton, *Agricultural Engineering, Wareham*
Joseph M. O'Byrne, *Mechanical Engineering*
Paul A. Pollock, *Agricultural Communications*
John L. Ragle, *Chemistry*
Noel J. Reebenacker, *Physical Education*
Vincent R. Rogers, *Education*
F. Miles Sawyer, *Food Technology*
Robert H. Wyllie, *Education*

To Editor:

Marjorie L. Harthan

To Farm Superintendent:

Bernard L. Hilton

To Instructor:

Alphonso Gil-Azpeitia, *Mathematics*
John E. Beam, *Dairy & Animal Science* (½ time)
Thomas J. Becker, *Economics*
Rufus T. Bellamy, *English* (⅙ time)
Ernesto Beltran, *Chemistry* (¼ time)
Stanley M. Bemben, *Civil Engineering*
Robert A. Bieber, *Agricultural Economics* (½ time)
Howard E. Bigelow, *Botany*
Mrs. Margaret E. Bigelow, *Botany* (½ time)
David B. Boothby, *Mathematics* (⅓ time)
Frank R. Bridges, Jr., *Veterinary Science*
Mrs. Helen E. Brown, *Mathematics* (¾ time)
Isaac C. Camber, *Food Technology* (½ time)
You-keng Chiang, *Economics*
Elizabeth A. Clarke, *Nursing*
Justin L. Cobb, *Physical Education*
Warren L. Comstock, *Dairy & Animal Science* (½ time)
Mrs. Marjorie M. Cook, *Mathematics* (⅓ time)
John J. Coughlin, Jr., *Agricultural Communications*
Albert W. Craig, *History*
Seth H. Crowell, *Electrical Engineering* (½ time)
Marcel Daneau, *Agricultural Economics* (½ time)
Arthur D. D'Antonio, *Economics*
Frank M. DeFillipes, *Physics*
William Deminoff, *English*

Frederick J. Dzialo, *Civil Engineering*
George E. Egan, *Electrical Engineering* (½ time)
Paul Ellen, *Psychology* (⅓ time)
Heinrich Fenner, *Dairy & Animal Science*
Fred Fernich, *Dairy & Animal Science* (½ time)
Janet L. Fietsam, *Home Economics*
Melvin Gersham, *Bacteriology* (½ time)
Philip Goorian, *Agricultural Economics*
Edward M. Hadro, *Electrical Engineering*
Mrs. Lois S. Harris, *German* (½ time)
Jane A. Hastie, *Romance Languages*
Ernest L. Hayes, *Agricultural Economics* (½ time)
Mrs. Christiane Heller, *German* (½ time)
Ward M. Hunting, *Food Technology*
Vincent Ilardi, *History*
Robert J. James, *Physical Education*
Robert M. Jordan, *English* (¼ time)
Christopher Kantianis, *Landscape Architecture* (½ time)
Donald R. Lambert, *Food Technology* (½ time)
Arnold Levine, *Sociology*
Donald T. Liden, *Dairy & Animal Science* (½ time)
Frank Lindenfeld, *Sociology*
Mrs. Beverly W. May, *Speech*
Curtis Messinger, *Geology* (½ time)
Rud S. Meyerstein, *Romance Languages*
Robert V. Miller, *Psychology*
Mrs. Eleanor L. Niedeck, *Speech*
John C. Osgood, *Education* (½ time)
Thomas M. Ott, *Food Technology* (½ time)
Orlo A. Powell, Jr., *Mechanical Engineering* (½ time)
Mrs. Mary G. Powers, *Sociology* (½ time)
Pilar Regalado, *Spanish*
Jane D. Reid, *English* (½ time)
Charles L. Robertson, *Government* (¾ time)
Mrs. Grace S. Rollason, *Zoology*
Merton I. Rosenberg, *Electrical Engineering*
Nancy C. Rupp, *Physical Education for Women*
Bernard Ryack, *Psychology* (½ time)
Sylvan Schendler, *English* (½ time)
Nicholas F. Slobodyanik, *Bacteriology* (½ time)
Marion W. H. Sonnenfeld, *German* (½ time)
Marc J. Swartz, *Sociology*
Chee-Teck Tan, *Food Technology* (½ time)
Joseph Troll, *Agronomy*
William F. Woehrlin, *History*
Alfred M. Wynne, *Chemistry*

Resignations:

Professor:
Lee E. Holt, *English*
Roland W. Winterfield, *Veterinary Science*

Associate Professor:
Allen B. Barton, *Agricultural Engineering*
Richard M. Colwell, *Business Administration*
Arthur A. Socolow, *Geology*
Maurice A. Unger, *Business Finance*

Assistant Professor:

Donald K. Adams, *Education*
Edward P. Clancy, *Physics*
Dwight E. Erlick, *Psychology*
Edward G. Fennell, *Education*
Marcel Gagnon, *Food Technology*
Robert M. Kingdon, *History*
Portia A. Mears, *Experiment Station Editor*
Roger A. Morse, *Waltham*
Jerome Myers, *Psychology*
Leonard R. Parkinson, *Food Technology*
William M. Rourke, *Education*

Instructor:

Verne A. Adams, *Dairy & Animal Science*
Donald Anderson, *Chemistry* (¼ time)
William M. Atwood, *Agronomy*
David C. Bartlett, *Civil Engineering*
Mary M. Bartlett, *Dairy & Animal Science*
David J. Beaubien, *Electrical Engineering* (½ time)
Rufus T. Bellamy, *English* (⅙ time)
Ernesto G. Beltran, *Chemistry* (¼ time)
Sonya Bergquist, *Botany*
John L. Blaisdell, *Agricultural Engineering* (½ time)
William Bock, Jr., *Physical Education* (½ time)
Mrs. Helen E. Brown, *Mathematics* (¾ time)
Richard O. Carson, *Physics*
You-keng Chiang, *Economics*
Louis E. Conhaim, *History*
Seth H. Crowell, *Electrical Engineering* (½ time)
Mrs. Irene H. Davis, *Food Technology* (½ time)
Robert V. Decareau, *Food Technology* (½ time)
Francoise-Marguerite DuParquet, *Romance Languages* (⅓ time)
William H. Durfee, *Mathematics* (⅓ time)
George E. Egan, *Electrical Engineering* (½ time)
Elizabeth M. Elbert, *Food Technology* (½ time)
Mrs. Miriam F. Fiedler, *Psychology* (¼ time)
Mrs. Helen L. Field, *Psychology*
Harvey F. Fisher, *Chemistry*
Remo Franceschini, *Food Technology* (½ time)
James Gardner, *Landscape Architecture* (½ time)
Gladys Geiger, *Home Economics*
Edward M. Hadro, *Electrical Engineering*
Joseph B. Hampton, *Government*
Mrs. Jane A. Hastie, *Romance Languages*
Roland F. Hess, Jr., *Physical Education* (½ time)
Robin D. S. Higham, *History*
John L. Hobart, *Dairy & Animal Science*
Richard F. Jackson, *Food Technology* (½ time)
Harry S. Jewusiak, *Electrical Engineering*
Miguel A. Jimenez, *Food Technology*
Mrs. Vilma V. Joa, *Romance Languages* (½ time)
Robert M. Jordan, *English* (¼ time)
Reuben Khatchikian, *Food Technology* (½ time)
Robert K. Kinsey, *Economics*
Rauno A. Lampi, *Food Technology* (½ time)
Arnold E. Levitt, *Chemistry*

Harvey Lifton, *Psychology* (¼ time)
John A. MacCombie, *French*
Donald F. McCaffrey, *Education* (½ time)
Ira Mintz, *Psychology* (½ time)
Anand G. Naik-Kurade, *Food Technology* (½ time)
Mrs. Clara K. Nicholson, *Agricultural Economics* (½ time)
Neil L. Norcross, *Bacteriology* (½ time)
Mary Jean O'Donnell, *English* (½ time)
Clifford N. Oliver, *Mathematics* (¼ time)
John C. Osgood, *Education* (½ time)
Donald A. Parks, *Geology* (½ time)
Joseph A. Pavelcak, *Mathematics* (⅓ time)
Mrs. Mary G. Powers, *Agricultural Economics*
Avrom Romm, *Government* (⅓ time)
Bernard L. Ryack, *Psychology* (½ time)
Joseph L. Sannelle, *Chemistry* (¼ time)
Sylvan Schendler, *English* (½ time)
Neal T. Watson, *Mathematics*
John M. White, *Agronomy* (½ time)
Robert E. Will, *Economics*
Theodore Wishnetsky, *Food Technology* (½ time)
Henry B. Woronicz, *Physical Education*

Leaves of Absence:

Doris E. Abramson
John S. Bailey
David R. Clark
Frederick E. Cole
Edwin D. Driver
J. Murray Elliot
Ralph L. France
Paul A. Gagnon
E. Vickery Hubbard
Oreana Merriam
John W. Mohn
Israel H. Rose
Sidney Schoeffler
Walter W. Smith
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Mrs. Margaret K. Wilhelm
Thomas O. Wilkinson

U of M

General Information

UNIVERSITY OF MASSACHUSETTS BULLETIN

University of Massachusetts at Amherst

General Information Bulletin

FOREWORD

The General Information Bulletin has been prepared for the prospective undergraduate to acquaint the student with all phases of the University of Massachusetts.

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Student Union Director William David Scott	Student Union

UNDERGRADUATE MAJORS

College of Arts and Sciences

- Art
- Bacteriology
- Botany
- Chemistry
- Economics
- English
- Geology and Mineralogy
- German
- Government
- History
- Mathematics
- Music
- Philosophy
- Physics
- Pre-Dental
- Pre-Medical
- Pre-Veterinary
- Public Health
- Psychology
- Romance Languages
- Sociology
- Speech
- Zoology

College of Agriculture

- Agricultural Economics and Farm Management
- Agronomy
- Animal Husbandry
- Dairy and Animal Science
- Entomology
- Floriculture
- Food Management
- Food Technology and Fisheries Technology
- Forestry
- Landscape Architecture
- Landscape Operations
- Olericulture
- Pomology
- Poultry Husbandry
- Wildlife Management

School of Business Administration

- Accounting
- Finance
- General Business
- Management
- Marketing
- Merchandising

School of Education

- Education
- Elementary Education

School of Engineering

- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering

School of Home Economics

- Child Development and Family Life Education
- Foods, Nutrition and Institutional Administration
- Pre-research in Nutrition
- Home Economics Education and Extension
- Merchandising

School of Nursing

- General Nursing

Division of Physical Education

- Physical Education for Men
- Recreation Leadership
- Physical Education for Women

GENERAL INFORMATION

The University of Massachusetts is the state university of the Commonwealth, founded under the provisions of the Morrill Land Grant Act of Congress of 1862. Representative Morrill envisioned the bill as "adding new securities to the perpetuity of republican institutions . . . It will prove a blessing to the whole people now and for ages to come."

Part of the great national resource of public higher institutions made possible through the Land Grant Bill, the University of Massachusetts serves Massachusetts youth in their educational needs beyond high school.

Situated in one of the most picturesque sections of the state, at Amherst, the University makes its contribution to the educational and cultural heritage maintained in the Connecticut Valley by Amherst College, Smith and Mount Holyoke colleges.

The trustees of Massachusetts Agricultural College were incorporated in 1863 and when the college was formally opened in 1867, there were four teachers and four wooden buildings. From this beginning, the institution grew steadily both in student and scope. Reflecting the broadening interests of its curriculum, the Great and General Court of Massachusetts authorized a second name, Massachusetts State College in April, 1931. The Bachelor of Arts degree was awarded in 1939 by trustee vote, in addition to the Bachelor of Science degree. In May, 1947, the Legislature approved the present name, University of Massachusetts.

The University of Massachusetts, located in the town of Amherst, has a campus of approximately 700 acres. In addition to the central campus, the University owns one area of 755 acres, six miles north of the campus on Mount Toby. An additional tract includes 1200 acres of forest land on Mount Lincoln, several miles to the east of the campus. These holdings are administered by the Department of Forestry as demonstration forests.

The University also operates a horticultural field station at Waltham and a cranberry field station at East Wareham.

The future growth of the University has been carefully planned, with provisions for buildings and facilities to accommodate an enrollment of 10,000 by 1965. The expansion has been charted in a new publication, The Master Plan.

Current construction includes expansion of chemistry laboratories, doubling the capacity of the University library, a new science center, and a new liberal arts classroom. The Legislature appropri-

ated nearly eight million dollars for the 1957 budget. Since 1947, the lawmakers have approved a total of 25 million dollars for educational facilities.

The University of Massachusetts serves the entire Commonwealth in the fields of resident instruction, research and extension.

BRANCHES OF INSTRUCTION

The Undergraduate College

The University offers four-year undergraduate instruction leading to the following degrees: Bachelor of Science, Bachelor of Arts, Bachelor of Science in Chemical, Civil, Electrical and Mechanical Engineering, Bachelor of Business Administration and Bachelor of Vocational Agriculture.

This instruction is assigned to the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing and to the Division of Physical Education. The aim of the four-year course is to give as high a degree of proficiency in some particular branch of learning as is possible without sacrificing the breadth, knowledge, and training which should characterize a well-rounded college education.

The degree of Bachelor of Science is conferred upon those candidates who complete curriculum requirements of 120 credits including the specialization requirements in a particular biological or physical science department of the College of Arts and Sciences. The Bachelor of Science degree is awarded also to students who complete the curriculum requirements of the College of Agriculture, the Schools of Home Economics and Nursing, and the Division of Physical Education. This degree may be granted to students majoring in Education or Psychology who complete a minimum of 15 junior-senior credits in science departments of the College of Arts and Sciences.

The degree of Bachelor of Arts is awarded to all candidates who complete the curriculum requirements of the College of Arts and Sciences including the specialization requirements of a department in the College. The Bachelor of Arts degree is awarded also to student who completes the curriculum requirements of the School of Education.

All graduates from the School of Engineering will receive the appropriate degrees of Bachelor of Science in Chemical Engineering, Civil Engineering, Electrical Engineering or Mechanical Engineering.

All graduates from the School of Business Administration will receive the degree of Bachelor of Business Administration.

Special arrangements are made for some graduates of county agricultural schools and of agricultural departments of certain high schools to complete the college course with majors in agriculture or horticulture. Upon the completion of their course they will be granted a Bachelor of Vocational Agriculture degree.

The Graduate School

Graduate courses leading to the Doctor of Philosophy degree may be taken in the following fields: Agronomy, Bacteriology, Botany, Chemistry, Economics, Entomology, Food Sciences, Food Technology and Psychology.

The following departments offer major work leading to a Master's degree: Agricultural Economics, Agricultural Engineering, Agronomy, Bacteriology, Botany, Business Administration, Chemistry, Chemical Engineering, Civil Engineering, Dairy and Animal Science, Economics, Education, Electrical Engineering, English, Entomology, Floriculture, Food Technology, Forestry, Geology and Mineralogy, Government, History, Home Economics, Landscape Architecture, Mathematics, Mechanical Engineering, Olericulture, Philosophy, Physics, Pomology, Poultry Science, Psychology, Public Health, Romance Languages, Sociology, Wildlife Management, Zoology.

The degree of Master of Landscape Architecture is granted to students completing the two years' graduate work offered by the Department of Landscape Architecture; while students taking the equivalent of one year's graduate work in that major may be granted the degree of Bachelor of Landscape Architecture.

Several other departments in the University, while not regularly organized for major work in the Graduate School, do, nevertheless, offer courses which may be selected for minor credit.

The general requirements of the Graduate School regarding admission, residence, credits, tuition, etc., together with specific information concerning details of interest to prospective students, are outlined in a separate bulletin, which may be obtained upon request from the Dean of the Graduate School.

The School of Business Administration offers, through the Graduate School of the University, a program of advanced study in Business leading to the degree of Master of Business Administration.

Summer Sessions

An expanded summer program enables the student to earn nearly the equivalent of a full semester's work. The sessions of the summer

of 1959 will be open to freshmen who wish to begin their college education immediately following graduation from high school. The summer program also serves the needs of students currently enrolled in colleges; graduate students; and professional workers seeking courses in specialized fields. An additional bulletin describing the entire summer program will be available from the Director of the Summer Sessions.

The Stockbridge School of Agriculture

The University, through its Short Course division, as a special service under the Land-Grant Act by which it was established, provides a complete non-degree program of two-year technical and vocational courses in the fields of agriculture and horticulture.

This School was organized at the University in 1918 under the name of "The Two-Year Course in Practical Agriculture." Its purpose was to meet the demand for shorter courses in agriculture which might be taken by high school graduates who could not satisfy college entrance requirements or who were unable to take the four-year college course. In 1928 the School was given its present name in honor of Levi Stockbridge, first professor of agriculture at the University and its fifth president.

This program trains men and women primarily for the practice of farming or associated agricultural industries. A diploma is awarded for satisfactory completion of the course.

As the two-year program is now organized a student may choose any one of eleven vocational courses including dairy farming, dairy manufactures or milk plant operation; poultry farming, arboriculture or the care of trees; fine turf maintenance for golf courses, cemeteries, parks, and playgrounds; commercial flower growing, both retail and wholesale; food management for clubs, hotels, and restaurants; commercial fruit farming, ornamental horticulture or landscape gardening; commercial vegetable farming, and applied forestry for timber growing and forest products industries.

On-the-job placement training is required of all first year students in the second semester for a period of four to seven months, depending on type of employment. No student can earn a diploma of graduation without this applied training experience. Wages earned can pay a large part of second year expenses if the student is forced to economize.

Limited enrollment quotas in each major course make necessary early filing of application. No formal entrance examinations are required for non-degree short courses.

A catalogue, giving complete description of all two-year courses offered in The Stockbridge School of Agriculture, as well as full

details on estimated costs, employment opportunities in each field, and entrance arrangements is available. Application form is printed in the catalogue. Write to Director of Short Courses, University of Massachusetts, Amherst.

Other Non-Degree Short Courses

Other short courses, varying in length from one to ten weeks, furnish supplementary training for city and town sanitary inspectors, tree wardens and city foresters, golf course greenkeepers, and skilled workers in dairy and ice cream plants. A certificate is presented upon the satisfactory completion of the course.

Research and Regulatory Services

The University of Massachusetts serves the fields of agriculture and horticulture through its Experiment Station, which provides research and regulatory services. Experiment stations were established in all states as the need of development of practical information on subjects relating to agriculture became apparent. Through the efforts of experiment stations a fund of scientific knowledge applicable to agriculture and horticulture has been accumulated, and research workers in the experiment stations continue to contribute to this knowledge by constant research and experimentation.

At the University of Massachusetts, the Experiment Station service has expanded until it now deals with problems in the following fields of specialization: Agricultural Economics and Farm Management, Agronomy, Animal Husbandry, Bacteriology, Botany, Chemistry, Dairy Industry, Economics, Engineering, Entomology, Horticulture, Floriculture, Food Technology, Nutrition, Olericulture, Pomology, Poultry Science, and Veterinary Science. Most of the research activities of the University of Massachusetts are undertaken at the main Experiment Station at Amherst. There are, however, two substations, one at Waltham, devoted largely to the problems of horticulture as applied to olericulture, floriculture, and nursery culture, and one at East Wareham, where attempts are in progress to solve the problems of the cranberry and blueberry growers.

In addition to the work described above, the administration of certain regulatory services, as pertaining to the sale of feeds, fertilizers, and seeds and to the use of dairy glassware, is also assigned to the Experiment Station which is equipped with the necessary laboratory facilities and personnel for that purpose.

Extension Service

The Massachusetts Extension Service is a cooperative teaching effort between the United States Department of Agriculture, the University of Massachusetts and the several counties of the State. The work of the Extension Service is carried on through unified teaching programs in all parts of Massachusetts. The Extension Service assists the people of the farm, the home, and the rural communities to improve agriculture, home making, and rural life. The University of Massachusetts is the State Extension Service headquarters. Extension educational teaching plans are made in council with the people who determine their problems and help to suggest methods and practices for their solution.

The Extension effort was brought about by the Smith-Lever Law, passed by Congress on May 8, 1914. Since that time, the service has grown to a staff of over 100 State and County workers who conduct an educational program in all phases of agriculture and homemaking among the adults and young people (4-H Club work) of the State. All types of methods, including subject matter, meetings, demonstrations, farm and home visits, publications, visual aid, and radio are used in carrying out this educational program directly in the farm and rural areas of the State. During the war emergency, the Extension Service extended its home food production and preservation program to the urban areas.

ADMISSION

Applications for admission may be obtained by writing the Registrar of the University. Candidates are advised to file their applications early in the senior year and certainly not later than March 1 of the year they plan to enter.

Qualified applicants are admitted at the beginning of the fall and spring semesters and at the beginning of the ten weeks summer session. Since there are many more qualified applicants than can be admitted, however, preference has to be given to those with the highest ratings.

All applicants for admission except veterans and candidates for the Bachelor of Vocational Agriculture degree must take the Scholastic Aptitude Test given by the College Entrance Examination Board. In addition, the University reserves the right to require three Achievement Tests administered by the same Board if the applicant's scholastic record includes several subjects below the college recommending grade of the school. Each applicant will be informed of the procedure he must follow at the time his application is acknowledged.

Methods

A. *High School Seniors*

High school seniors are advised to file their applications early in the senior year. The Scholastic Aptitude Test may be taken on any of the scheduled dates. The January date is recommended except for those applying for early acceptance. The May date is usually too late for seniors, but is appropriate for juniors taking the test for guidance purposes.

Some applicants have a definite first preference for the University and have records that deserve early consideration. Such applicants will be accepted early in their senior year under the following conditions. They must be taking the usual college preparatory course in high school and maintaining the college recommending grade of the school in all of their courses. They must take the College Board Scholastic Aptitude Test in the junior year, preferably in May, and make a score satisfactory to the University. They must indicate the University as their first preference.

Under these conditions the University will be glad to accept such students as indication of excellent achievement in high school and to reduce some of the anxiety that an applicant feels during the senior year while waiting for action usually taken in the spring.

In this way, too, the burden of multiple applications on high school principals and college admissions officers may be lessened.

B. *High Ranking High School Juniors*

Applicants who have completed with very high academic standing work through the junior year may be admitted to the University for the semester following the junior year. Such applicants must take the Scholastic Aptitude and three Achievement Tests given by the College Board in May of the junior year and make scores satisfactory to the University. They must be highly recommended by their high school principal. The maturity and social adjustment of the applicant will be considered along with his intellectual development. Such applicants should apply before the end of the junior year.

C. *Veterans*

Veterans are not required to take the Scholastic Aptitude Test. Instead, they must take entrance examinations in Algebra and English and a College Qualification Test. These are administered by the University Testing Service in January, June and August. Information in regard to these tests will be furnished the veteran at the time he files his application for admission. "Six Months Active Duty for Training" students are not considered veterans. They must take the College Board Scholastic Aptitude Test rather than the Veterans' Examinations.

D. *Bachelor of Vocational Agriculture Degree*

Superior graduates of Vocational Schools of Agriculture in Massachusetts and Vocational Agricultural Departments in Massachusetts High Schools may be accepted for the Degree of Bachelor of Vocational Agriculture, provided:

a. They are unqualifiedly recommended by the Vocational Division of the Department of Education as *bona fide* Vocational Graduates with superior ranks; and
b. That they can present at least 16 units of certified entrance credits, approved as to quality and quantity by the State Department of Vocational Education.

E. *Transfer*

A limited number of transfers from approved colleges may be admitted. Since applications for such transfer exceed the number that can be admitted, they are placed on a competitive basis.

Ratings will be based upon high school and college records and on the College Board Scholastic Aptitude Test, which is required of all transfers. The University reserves the right to require the College Board Achievement Tests also, if the applicant's records make such advisable. Information in regard to transfer may be obtained by writing the Registrar.

At least 45 semester credits taken in residence at the University are required of all transfers who are candidates for the Bachelor's Degree.

Subject Requirements

The subjects of preparatory study required for admission call for the satisfactory completion of a four-year high school course or its equivalent and are stated in terms of units. A unit is the equivalent of at least four recitations a week for a school year. High school graduation alone is not sufficient. The applicant's record must indicate capacity for handling the quality of scholastic work which the University has established as its standard of achievement.

Sixteen units of secondary school work must be offered, selected according to the following requirements:

Algebra	1½
Plane Geometry	1
English	4
Foreign Language (2 years of 1 language)	2
U. S. History	1

The remaining units are elective and may be selected from the following subject matter:

a. Mathematics
b. Science
c. Foreign Language
d. History and Social Studies
e. Free electives (not more than four units)

Free elective subjects are those not included in groups a-d, as for example: Music, art, drawing, typewriting, aeronautics, agriculture, home economics, etc. Such free electives are allowed in order that the student who wishes may have some opportunity to elect other high school offerings, while at the same time covering the fundamental requirements for college work.

Students planning to pursue an engineering curriculum should offer two years of algebra, one of plane geometry, and one-half

year each of trigonometry and solid geometry, chemistry and physics are also advised. Those deficient in the mathematics should plan to cover it during the summer prior to entrance or expect to take five years to complete the college course.

In high schools organizing agricultural club work under the supervision and rules of the Junior Extension Service of the University, one credit is granted for each full year of work approved by state leaders.

Candidates of exceptional ability and promise may be considered for admission even though some of the prescribed courses were not included in their high school program.

Physical Examination

Physical examination by their local doctor is required of all entering freshmen, re-entering students and all students participating in athletics. Physical report forms for this examination will be mailed to each student with the bill for the first semester and must be completed and returned to the University Health Service 10 days before the opening of the semester. Evidence of a successful smallpox vaccination is required.

Veterans' Affairs

The Veterans' Coordinator is a member of the Placement Service.

Veterans enrolling for the first time must file a Certificate of Eligibility with the Placement Office prior to or at registration. All veterans should clear their affairs through the Placement Service.

EXPENSES

University Fees

Expenses vary from approximately $870 to $900 per year for the normally economical student. First year costs are usually greater than those of the other three years and there is less opportunity to earn. A student is advised to have a definite plan for meeting the expenses of the first year before entering.

Freshmen entering the School of Engineering should be prepared to meet an expense of approximately $35 for drawing equipment and a slide rule.

The following estimate of a year's expenses, based upon last year's costs, includes only those items which are strictly college and does not include amounts for clothing, laundry, travel, etc. These costs vary slightly from year to year. Tuition for residents of Massachusetts is $100 per year and for others $600.

Year's Expenses

	Normal
Tuition (resident)	$100.00
Room rent, dormitory	200.00
Board (University Dining Commons)	350.15*†
Activities Fee	23.00
Athletic Fee	20.00
Physical Education Fee (freshman men only)	10.00
Student Union Fee	20.00
Military Uniform (freshman men only, deposit)	30.00
Identification Fee	1.00
Counseling & Testing (freshmen only)	15.00
Books, stationery, etc. (approximate)	100.00
	$869.15

* Student ticket basis, cash rate slightly higher.

† Above plan for five day week, 15 meals. University also offers 7 day plan, 19 meals, $225.10 for first semester or $425.75 per year.

Initial Payment for Freshmen

The initial payment required of freshmen at the time of fall registration is indicated below and is made up of the following items.

Tuition (resident)	$ 50.00	
Room rent, dormitory	100.00	
Board (University Dining Commons)	175.90*†	
Activities Fee	11.50	
Athletic Fee	10.00	
Student Union Fee	10.00	
Physical Education Fee (men only)	10.00	
Military Uniform (men only, deposit)	30.00	
Identification Fee	1.00	
Books, stationery, etc. (approximate)	60.00	
		$458.40

*Student ticket basis, cash rate slightly higher.

†Above plan for five day week, 15 meals. University also offers 7 day plan, 19 meals, $225.10 for first semester or $425.75 per year.

The above are only approximate figures. A bill will be rendered to the parent of each student prior to the opening of the University.

Tuition

As a state institution the University of Massachusetts offers a low rate of tuition to all students entering from the Commonwealth. Eligibility for admission under the low residential rate is determined in accordance with the following policy established by the Board of Trustees.

A student must present evidence satisfactory to the Treasurer of the University that his domicile is in the Commonwealth of Massachusetts in order to be considered eligible to register in the University as a resident student. This means that he must have established a *bona fide* residence in the Commonwealth with the intention of continuing to maintain it as such. Misrepresentation of facts in order to evade the payment of out-of-state tuition shall be considered sufficient cause for suspension or permanent exclusion from the University.

Discretion to adjust individual cases within the spirit of these rules is lodged with the President of the University.

Board

The University provides three dining halls for students at Butterfield House, Greenough House and University Dining Commons. The dining halls at Butterfield and Greenough dormitories are intended primarily to provide for students housed in that area, including residents of Chadbourne, Mills and Brooks Houses.

All freshmen, sophomores and juniors residing in University Dormitories will be required to board at University dining halls, except that such students who are members of fraternities or sororities are permitted to board at their respective fraternities or sororities.

Any student who wishes may board at University dining halls on the ticket plan or cash basis.

Military Uniform

All freshmen students taking military drill are required to make a deposit of $30 for the uniform at the time the first semester bill is paid.

Student Activity Tax

This tax, authorized by vote of the undergraduate students with the approval of the Board of Trustees, provides each student with the *Collegian,* the student newspaper; *Index,* University annual; Social Union privileges, student government, class and other activities.

PAYMENTS

Advanced Payment

New students will be expected to make an advance payment of $15 to the Treasurer of the University as soon as they are notified by the Registrar that they are accepted for admission. This will be considered as first payment on registration fee, which will be due at time of matriculation in September. It is not refundable and will be considered as payment for admissions and registration expense if the student does not matriculate.

A Certificate of Residence form furnished by the University must be properly filled out by the parent and the town or city clerk and returned with the $15 advance payment.

When Payments Are Due

In accordance with policy established by the Board of Trustees, all charges for tuition, fees, board, and room rent in University

Dormitories are due and payable seven days prior to the date of registration of each semester. Bills will be rendered in advance and payments may best be made by mail. Students may not register until registration charges are paid.

Veterans' Information

Veterans who are entering the University for the first time under the old G.I. Bill (P.L. 346) must present a Certificate of Eligibility at registration. This may be obtained from your nearest Veterans Administration office. Veterans failing to obtain the Certificate of Eligibility must make payment of tuition and fees in order to register. Board and room fees must be paid in advance whether enrolled under the G.I. Bill or not.

Veterans (under P.L. 346) who are transferring to the University of Massachusetts from another institution or who have done summer work at another institution will be required to submit a supplemental Certificate of Eligibility at registration. This may be obtained by applying through the veterans' office at the institution last attended.

Veterans entering under the new G.I. Bill (P.L. 550) must meet all expenses personally. Presentation of a Certificate of Eligibility should insure the receipt of subsistence checks from the Veterans Administration.

FINANCIAL AID

Scholarships, loans, and part-time employment are available for a limited number of needy and deserving students.

Aid for Freshman Year

Freshmen are eligible for scholarships and part-time employment. A freshman also becomes eligible for assistance from loan funds after satisfactorily completing one semester of academic work. Scholarship application blanks may be secured from the Registrar and should be filed by March 15. Part-time employment application forms may be obtained from the Director of Placement Service and filed after a candidate has been accepted for admission.

Because of the time required for preparation of studies, few students should plan to spend more than ten hours per week in part-time employment.

SPECIAL SERVICES

Religious Life

The University makes an effort to provide a wholesome and stimulating spiritual atmosphere for the students by cooperating with official agencies of the three faiths most largely represented at the University.

On the campus the religious life of Catholic students is enriched by the Newman Club, of which Rev. David J. Power of Saint Brigid's Parish is chaplain. Jewish students may participate in services and activities at the local Hillel House, under the chaplaincy of Rabbi Louis Ruchames of Northampton; and Protestant students may join in worship and other religious activities conducted by the Student Christian Association, under the guidance of the Rev. Albert Seely, chaplain to Protestant students.

The churches of Amherst provide not only the usual opportunities for worship and participation in church work, but special events for students. Students are particularly encouraged to attend Sunday service in the local church of their respective faiths.

Health Service

The Health Service is a separate administrative unit dealing with all matters directly or indirectly influencing or affecting the health of staff members, employees, students, or campus visitors.

The University endeavors to safeguard the health of all students while on the campus. Basic medical attention is provided, including preliminary diagnosis, primary treatment of injuries, and temporary care of the sick. A group of three infirmary buildings and a staff of resident physicians and resident nurses is available to perform these functions.

The Placement Service

The University maintains a centralized Placement Service, the function of which is to assist students to secure part-time, summer, or permanent employment and to administer the required Placement Training Program.

SPECIAL SERVICES

The University is keenly interested that each graduate has an opportunity to serve his fellow men in an occupation consistent with his interests, abilities, aptitudes, and education. To assist students to accomplish their objectives, the following aids are available: cumulative student personnel records, occupational information, library, counselling and guidance in job hunting techniques, preparation of credentials and personal data sheets and personal interviews.

The Placement Service is the clearing center for all part-time jobs at the University. Students are assisted in obtaining part-time work during the college year and full-time work during the summer vacation. Employment is not guaranteed, but every effort is made to help those students who must work to meet their college expenses. In order to give assistance to as many needy students as possible, the Student Aid Committee has adopted the policy of limiting the maximum financial aid per student to the equivalent of board. The average earnings of students engaged in part-time work is approximately $150 per year.

All student loans, veterans' affairs and draft information are also functions of the Placement Service.

Publications and News Office

The University recognizes its obligation to provide the public with accurate information about its educational program. With the rising public interest in higher education, news of the University is sought by all communications media, including the daily and weekly press, radio and television.

In addition to providing information through mass media, the Publications and News Office maintains contacts with institutions of higher learning throughout the country with exchange of information in professional journals and publications of educational societies.

Daily training in news writing is provided for a limited number of students who report on University activities and prepare copy for general news releases.

The catalogues describing various phases of the academic program of the University are edited in the Publications and News Office.

Alumni Association

The Associate Alumni is the general organization of the alumni, men and women, of the University of Massachusetts. The association maintains headquarters at Memorial Hall, erected by alumni

and friends in honor of those men of the University who died in World War I.

It publishes a magazine, *The Massachusetts Alumnus,* as the alumni publication of the University..

According to its by-laws the corporation is constituted for the purpose of promoting the general usefulness of the University of Massachusetts; of cultivating among its graduates and former students a sentiment of mutual regard; and of strengthening their attachment to their Alma Mater.

Under sponsorship of the U. Mass. Building Association, comprised of alumni who volunteer their services, 14 dormitories, a faculty apartment building and a Student Union Building have been constructed on the campus.

The governing body of the Associate Alumni consists of its officers and a board of directors. Four directors are elected each year and serve a term of four years. All graduating seniors become members of, and contributors to, the association at graduation, according to a tradition set by the Class of 1940.

Audio-Visual Center

The Audio-Visual Center is organized to help the professional staff through the use of audio-visual materials. The center has libraries of aids, a pool of equipment and provides certain services. About 850 titles are available in a sound motion picture library and a filmstrip library of 400 titles. Technical assistance is available for the preparation of aids for instructional purposes, including recordings, charts and other graphics.

SPECIAL INSTITUTES AND SERVICES

Bureau of Government Research

A Bureau of Government Research was established at the University of Massachusetts on October 1, 1955. The Bureau is staffed by professional personnel experienced in local government research. Its work consists of research, publication and cooperative activities with local government officials of the Commonwealth.

College English Association

The offices of the Executive Director of the College English Association are maintained in South College. This is a national

association of teachers of college English. The organization's monthly publication, *The CEA Critic,* is edited and published on the campus.

American Humanities Center

The offices of the executive director of the American Humanities Center for Liberal Education are maintained at South College. This is a national agency fostering strengthened relationships between the liberal arts and sciences and the world of affairs and action.

The American Humanities Seminar, under the auspices of the University and the Center, is held annually on campus (late June or early July). It seeks to strengthen cooperation among the liberal arts and sciences and the technological fields.

New England Field Training Station

Sponsored jointly by the Public Health Service of the U. S. Department of Health, Education and Welfare, and the University's Department of Bacteriology and Public Health, the New England Field Training Station has been located on the campus since 1949. The Station instructs health department sanitarians and other health department personnel through in-service training courses.

UNIVERSITY REGULATIONS

Standards of Deportment

The customary high standard of college men and women in honor, self-respect, and consideration for the rights of others constitutes the ideal of student deportment.

The privileges of the University may be withdrawn from any student at any time if such action is deemed advisable.

It should be understood that the University, acting through its president or any administrative officer designated by him, distinctly reserves the right, not only to suspend or dismiss students, but also to name conditions under which they may remain in the institution.

Hazing in the sense of the punishment or humiliation of students is not permitted.

Registration

Every student must report for registration on the appointed day. All late registrants must pay a $5 fine. No student will be admitted to any class until he has completed the prescribed registration procedure. Changes of courses on the registration card shall be made only by the Registrar's Office.

Any student who does not complete his registration, including payment of semester charges, on the regular registration days will be required to pay a fine of $5.

No course will be recorded on the permanent records of the University nor will a student receive credit for it, unless such course appears on the registration card for the semester and has been properly countersigned by the instructor.

Freshman Week

All members of the incoming freshman class are required to be in residence on the campus for the period known as Freshman Orientation. During this period students will be given psychological tests, in addition there will be lectures on student activities, customs, and curricula, and a scheduled meeting with the student's adviser.

STUDENT HOUSING

All men and women students are housed in campus dormitories and are required to eat at University dining halls unless given permission to commute or to live at sorority or fraternity houses. University board is optional for seniors and is available on a cash basis. Sororities and fraternities may furnish regular board to members up to the approved capacity for each house.

Rooms for Women Students

Dormitory rooms are available for women students at Abigail Adams, Arnold, Crabtree, Hamlin, Knowlton, Leach, and Thatcher Houses.

Under the supervision of the Dean of Women, life in each dormitory is directed by a council of student leaders, advised by a full time housemother, so that conditions in the residence halls are conducive to study and good living habits. Through the women's branch of the Student Government, the responsibility is put upon each student to live according to her own best standards as well as according to the standards of the group.

Freshman girls will be assigned rooms in the dormitory and will be notified of the assignment prior to the beginning of college.

Near the close of each year, upperclass women will draw numbers to determine the order in which rooms may be chosen for the coming year.

Only students living in their own homes may commute. Upperclass women may apply to the Dean of Women for permission to live in a sorority house, or to earn room and board in a private home.

Dormitories are maintained for undergraduates; graduate women from other countries are also accommodated whenever possible. The Dean of Women's Office maintains a list of rooms in Amherst available for graduate women students.

Rooms for Men Students

Dormitory rooms are available for male students at Baker, Butterfield, Lewis, Van Meter, Brooks, Mills, Chadbourne, Greenough, Berkshire, Middlesex and Plymouth Houses.

Upperclassmen should make dormitory room reservations at the Housing Office before May 1. Assignment of dormitory rooms will be under the supervision of the Housing Office. Requests for permission to live off campus must be made in writing to the Dean of Men.

Rooms for Married Students

The University cannot guarantee facilities for married students; however, those married students who can be accommodated will be housed in the University apartment units. Assignments are under the direction of the Housing Office and all inquiries should be addressed to that office. Some students may be able to locate rooms or apartments off campus.

The University of Massachusetts reserves the right to change room assignments whenever necessary.

Advisory System

In order that from the day he enrolls the freshman may have some one to whom he may go for consultation and assistance, each student is assigned to a faculty adviser at the time of registration. It is the function of this adviser to help the student in adjusting himself to the work and life of the University. Academic progress reports issued by the Provost's Office are sent to the advisers periodically, and the students are expected to report to their advisers from time to time to discuss their academic standing. The adviser also forwards reports of academic standing to the parents. Both students and parents are encouraged to consult with the adviser whenever there are problems regarding studies or personal adjustments to college life.

At the beginning of the second semester of the freshman year each student will discuss his vocational and specialization plans with his adviser. If he can decide definitely upon the department in which he wishes to specialize, and the adviser approves, the student takes his election card to the head of that department for approval. In cases where students are not ready to designate a department of specialization they continue as general majors during the sophomore year under the direction of an adviser assigned by the head of the School in which the student is enrolled. Such general majors must select their field of specialization by the end of the sophomore year.

Automobiles

Only members of the Senior class are permitted to have automobiles or other types of automotive equipment on the campus or in the Town of Amherst. Vehicles must be registered with the Campus Police. Driving to and from classes is not permitted. Exceptions may be made in the case of an individual who has a severe physical limitation.

SCHOLARSHIPS, LOANS

Scholarships are awarded only to needy and deserving students of high character whose habits of life are economical and whose scholastic records are satisfactory. A limited number of these scholarships are available for entering freshmen.

Scholarships are paid in installments at the beginning of each semester in the form of a credit on the student's bill. A scholarship may be discontinued at the close of any semester.

If the scholarship student withdraws from the University, any refund of University fees or charges must first be applied to reimburse the scholarship fund for the full amount of the scholarship received by the student for the semester.

Applications for scholarships may be obtained from Fred P. Jeffrey, Stockbridge Hall, and must be completed and returned by March 15 to be considered.

GENERAL SCHOLARSHIPS

Commonwealth Scholarships. The Commonwealth of Massachusetts annually provides 25 scholarships of not more than $250 for members of each of the four undergraduate classes of the University. Upperclass students may obtain application forms from Fred P. Jeffrey, Stockbridge Hall. Entering freshmen may obtain application forms at the Registrar's Office.

LOANS

Through the generosity of friends of the University, funds have been donated to provide loans for a limited number of students of the three upper classes to assist in paying tuition or other college expenses. These loans are granted, after proper consideration, to needy students of good scholarship whose habits are economical. All loans are secured by a note endorsed by a responsible party as collateral. All such loans must be paid before graduation. Upon withdrawal from the University, loans automatically become due. Interest is charged at the rate of 3% to maturity, 5% thereafter on loans from all funds except the Lotta Agricultural Fund, from which loans are made without interest. Appplication for loans should

be made to the Student Aid Committee, Placement Service Office, South College. No loan will be granted in excess of $200 in any one year.

If funds are available at the beginning of the second semester, loans may be made in exceptional cases to members of the freshman class whose scholastic record is satisfactory and whose budget calculations have been upset through circumstances beyond their control.

STUDENT ORGANIZATIONS

One of the values received from the University course is the training one acquires through participation in student activities. Student organizations offer excellent opportunities for development of leadership and broadening of outlook.

Student Government

The Student Senate operating under the student constitution and composed of elected representatives from the student body is the governing council of undergraduates. Its aim is to promote the general welfare of the University and, in doing so, groups of both students and faculty meet to further their mutual interests. The Student Senate directs student conduct and represents the interests of the student body before the faculty.

Academic Honor Societies

Phi Kappa Phi. The Massachusetts Chapter of the Honor Society of Phi Kappa Phi was installed on the campus in 1904. Its prime object is to emphasize scholarship and character. Senior students from all departments of the University are eligible for election to membership provided the scholastic and character requirements of the Society are met.

Sigma Xi. The Society of Sigma Xi is a scientific fraternity to which members are elected on the basis of outstanding scientific research. The local chapter was established in 1938.

Omicron Nu. The Alpha Pi chapter of the Society of Omicron Nu was installed on the campus in 1952. The purpose of the society is to recognize superior scholarship and to promote leadership and research in home economics. Membership is open to juniors and seniors majoring in home economics who meet the requirements of the society.

Phi Tau Sigma. Phi Tau Sigma Honorary Society is the international honor society for food science. It was founded at the University of Massachusetts in 1953, and its executive headquarters are permanently located here. Its purpose is to encourage and recognize achievement in food science. Senior students from all departments related to food science are eligible for election to mem-

bership if they meet scholastic and character requirements of the University Chapter.

Sigma Gamma Epsilon. The Beta Theta chapter of the Sigma Gamma Epsilon Fraternity was installed at the University of Massachusetts in 1951. The purpose of the fraternity is to stimulate scholastic, scientific, and social advancement of its members and the extension of the relations of friendship and assistance between the universities and scientific schools with recognized standings in the United States and Canada, which are devoted to the advancement of the earth sciences. Membership is open to men majoring in geology, mining, metallurgy, ceramics, petroleum engineering, or other branches of earth sciences, who meet the requirements of the fraternity.

Phi Eta Sigma. The Society of Phi Eta Sigma was installed on the campus in 1955 to recognize outstanding scholastic achievement by freshmen men.

Tau Beta Pi. The Massachusetts Zeta chapter of Tau Beta Pi was installed on the campus in the fall of 1955. The society exists for the purpose of honoring engineering students of high scholarship and character, and who also participate in campus activities. Senior and junior students in the School of Engineering are eligible for election to membership if they meet the requirements.

Sigma Delta Psi. The Society of Sigma Delta Psi was installed on campus in 1955 to promote physical, mental and moral development of college men.

Service Fraternity

Alpha Phi Omega. A fraternity which renders various kinds of service to the University. The group is composed of former members of the Boy Scouts of America.

Student Honor Societies

Adelphia. The men's senior honor society, recognizing students who have been leaders in the extra-curricular activities of the campus.

Mortar Board. The Isogon Chapter of Mortar Board was installed at the University of Massachusetts in 1955. The purpose of the Society is to promote college loyalty, to advance the spirit of service and fellowship among University women, to maintain a high standardard of scholarship, to recognize and encourage leadership, and to stimulate and develop a fine type of college women. Membership

is composed of a total of not less than five or more than twenty-five girls from the senior class selected on the basis of service, scholarship, and leadership.

Maroon Key. Men's sophomore honor society, comprised of 25 students elected at the end of the freshman year.

Scrolls. Women's sophomore honor society, comprised of 15 students elected at the end of the freshman year.

Fraternities and Sororities

Social fraternities on the campus include Alpha Epsilon Pi, Alpha Gamma Rho, Alpha Sigma Phi, Alpha Tau Gamma, Delta Sigma Chi, Kappa Kappa, Kappa Sigma, Lambda Chi Alpha, Phi Mu Delta, Phi Sigma Kappa, Q.T.V., Sigma Alpha Epsilon, Sigma Phi Epsilon, Tau Epsilon Phi, Tau Kappa Epsilon, Theta Chi. An Inter-Fraternity council, consisting of representatives of these fraternities, has charge of rushing and all general matters dealing with fraternity life.

Sororities include Chi Omega, Kappa Alpha Theta, Kappa Kappa Gamma, Phi Delta Nu, Pi Beta Phi, Sigma Delta Tau, and Sigma Kappa. The Pan-Hellenic Council, made up of representatives from the sororities, supervises rushing and other sorority matters.

Extra-Curricular Activities

All extra-curricular activities are supervised by the Committee on Recognized Student Organizations composed of alumni, faculty, and students. Recognition is given in the annual award of gold and silver medals.

The Collegian. This is a tri-weekly newspaper published by undergraduates.

The Quarterly. A magazine in which the literary and artistic efforts of the students are published.

Index. The year book.

University Handbook. Published annually as a campus book of reference.

Ya Hoo is the campus humor magazine published three times a year.

University Musical Organizations. Open to all students of the University. For instrumentalists: Band, dance band, orchestra and ensembles; for vocalists: Chorus, Chorale, Operetta Guild and small

combinations. A women's drill team, the Precisionettes, performs at home games and ceremonies. The University Concert Association provides an annual series of major concerts by famous artists.

Drama. Drama is represented on the campus by the Roister Doisters, open to all four-year students interested in theater arts; and the University Players, open to those students who have shown outstanding ability, effort, and interest in some phase of dramatics through the Roister Doisters.

In addition, there are approximately 100 student organizations which offer an opportunity to participate in small group meetings.

Inter-Collegiate Athletics

The University Intercollegiate Athletic Program is supervised by the University Athletic Council and is composed of the following members: five faculty members appointed by the President, three alumni representatives appointed by the Directors of the Alumni Association, the Executive Secretary of the Alumni Association, and ex officio, the Director of Athletics.

The University believes there are educational advantages in participating in a well-organized intercollegiate and intramural sports program. In intercollegiate athletics, the University is represented by teams in all the leading sports, including football, soccer, cross-country, basketball, swimming, wrestling, indoor and outdoor track, hockey, rifle and pistol, baseball, tennis, golf, lacrosse, gymnastics, skiing.

The University also supports a broad program of intramural activities, in which all students are encouraged to participate. The range of sports available each year includes the team sports of touch football, basketball, softball, volleyball. Individual activities include tennis, bowling, badminton and golf.

The University of Massachusetts is a member of the Yankee Conference, the National Collegiate Athletic Association, the Eastern College Athletic Conference, the Association of New England Colleges for Conference on Athletics, and the I.C.A.A.

Professional Clubs

There are numerous professional clubs, established in connection with the various major courses of study. These clubs stimulate the students' professional interest in their chosen subject matter fields and afford opportunity for discussion of technical subjects of mutual interest.

UNDERGRADUATE CURRICULA

Undergraduate instruction is organized into the College of Arts and Sciences, the College of Agriculture, the Schools of Business Administration, Education, Engineering, Home Economics, Nursing, and the Division of Physical Education for Men.

This section of the bulletin deals with the opportunities for study and the curricula available in each of these departments of the University.

COLLEGE OF ARTS AND SCIENCES

FRED V. CAHILL, JR., *Dean*

The College of Arts and Sciences includes those departments offering instruction in the humanities, the physical and biological sciences, and the social sciences. Its curricula comprise both general education courses essential for enlightened citizenship and those necessary for specialized and professional training.

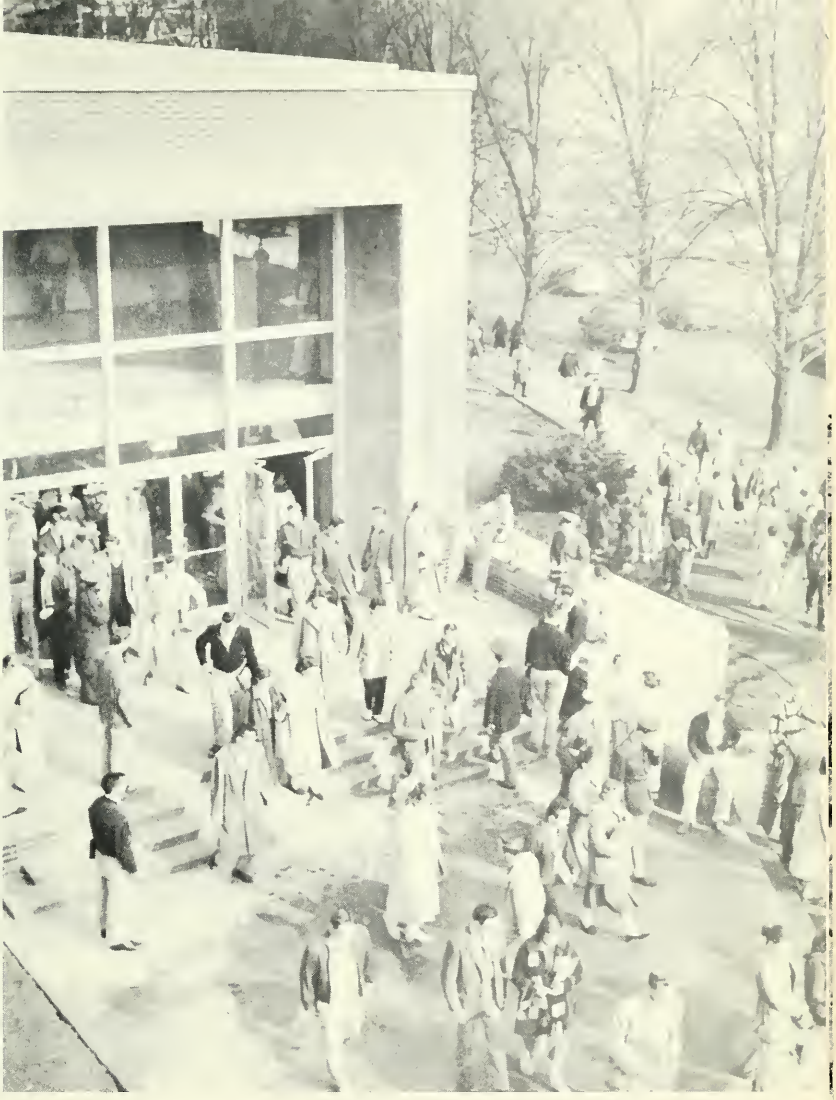
The work of the first two years is largely prescribed, specialization occurring in the junior and senior years. The concentration of the junior and senior years gives the student as high a proficiency in his field of specialization as is possible without sacrificing the objectives and requirements of a well-rounded education.

The majority of the curriculum prescribed for all freshmen and sophomores, regardless of their fields of specialization, is taught in the College. In addition, each of the departments of the College offers courses leading to undergraduate specialization in its particular field. There are also curricula designed to meet the special needs of pre-medical, pre-dental, and pre-veterinary students; of those planning to enter the public health service; and of those interested in social work.

In sum, the College provides training for: Persons primarily seeking a liberal education; those who, wishing to go on to specialization in one of the fields of the College, seek a liberal education and the beginnings of specialization; those, in other parts of the University, whose basic professional interests are outside the range of the College.

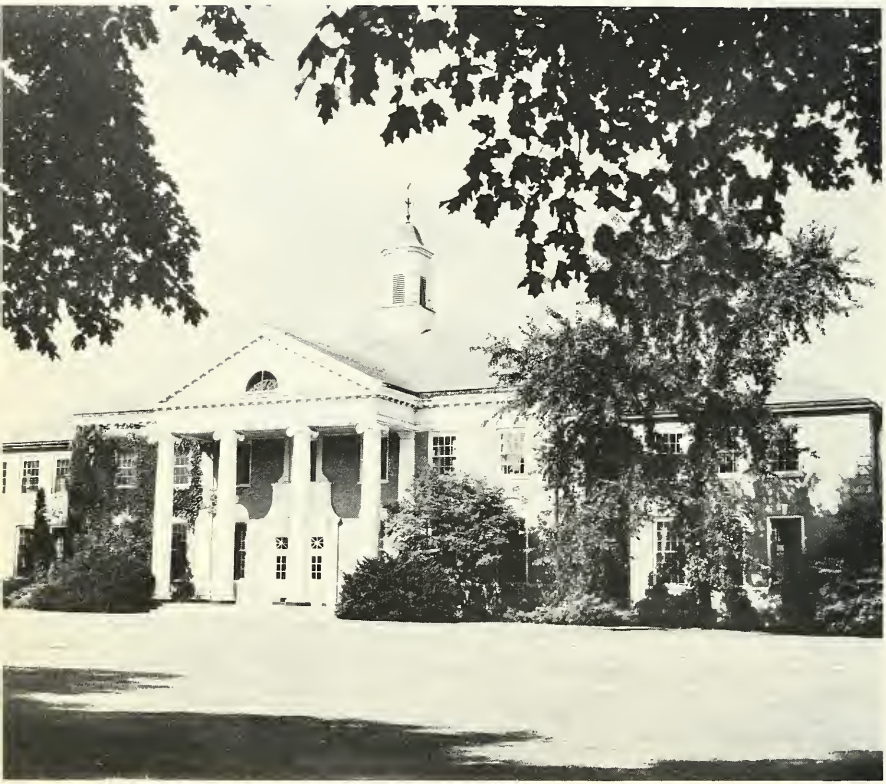
MAJORS

Major work is available in the following departments during the last two years.



What Is a University?

Faculty . . . Students . . . Buildin



The Library

Resource Center

. . . for quiet study

. . . and ready reference

. . . in a home

Relaxing and Studying

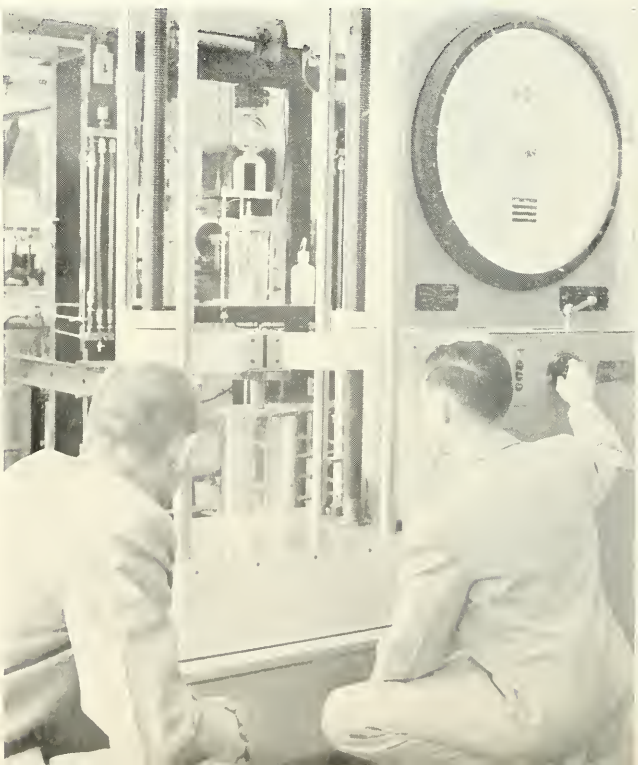
. . . within a home

. . . for men

. . . in languages

. . . in engineering

Laboratory Learning



. . . the search continues

. . . in the classroom

Student Union

Campus Center for
Recreation and
Extra Curricular Activities

Bacteriology

The courses in bacteriology have been planned to furnish (1) a general and applied training for students majoring in other departments who must have some knowledge of bacteria and (2) specialization for those contemplating a professional career in bacteriology.

Botany

Courses in botany aim to: (1) prepare students for teaching or research careers in biological sciences in high schools, universities, experiment stations, and industry; (2) acquaint students majoring in other fields to scientific method as part of their general education program; and (3) supplement work of other fields in which knowledge of plant life is important.

Chemistry

The objectives in chemistry are to give the student an understanding of the subject which will enable him to appreciate the relation of chemistry to other sciences, and to industry, and to provide training for those who intend to become teachers and workers in the allied sciences, and for those who wish to go on to graduate study and into a professional career in chemistry. Completion of the course in chemistry fits the student for positions in the chemical industries and related fields as well as in the agricultural industry, for employment in state and federal agricultural experiment stations and commercial laboratories, for teaching and for graduate study.

Economics

In economics the aims are twofold: (1) to give the student an understanding of economic theory and of the application of economic principles to the organization of society; (2) to provide students with the elementary training necessary for further study and solution of economic and business problems.

For the majors in economics, there are offered courses which may be combined to serve as preparation toward a number of different careers, including business, government, and teaching. Other careers include: Banking and finance, international trade, labor and personnel relations, market research, public utilities, social security, statistics, transportation and teaching.

English

The department of English offers courses in English composition, language, and literature. Students majoring in English must conform to the requirements for freshman and sophomore years, and in choosing sophomore electives should include one semester of English history, and two semesters of foreign language. At least two of the total of four semesters of foreign language required of English majors must be above the elementary level.

The courses in English are intended to enable students to express themselves effectively and to appreciate humanistic values and the ideals of English-speaking people throughout their history. The courses also offer an appropriate, and in some instances an adequate, classroom training for work in such fields as teaching, authorship and editing.

Geology and Mineralogy

The courses in geology are offered with three objectives in view: (1) to contribute to the cultural education of all students by providing a better understanding and a greater appreciation of the world we live in, and the evolution of life on it; (2) to give the basic preparation for a career in any of the various branches of geology; and (3) to afford the essential background in earth science required by students specializing in other fields such as engineering, conservation, agronomy, forestry, etc.

For students considering geology as a career, the opportunities are many. Those interested primarily in basic science may look to positions in teaching, in museum work, on state and federal surveys, and in various research organizations. Those concerned mainly with applied science may direct their efforts toward work in mining geology, petroleum geology, engineering geology, and ground-water geology.

German

The courses in German are intended to give a practical knowledge of the language for the purpose of wider reading, research, and oral communication.

Government

The courses offered by the department of government are designed to aid the student in gaining a knowledge of the nature,

functions, and problems of government, and of the place of government in the modern world. Political theory, constitutional law, international relations, comparative government, politics and public administration are the principal areas covered.

Students taking work in government may prepare themselves for (1) graduate study in political science and government, (2) careers in public administration at federal, state, and local levels, (3) research concerning governmental problems, (4) the study of law, (5) entrance into foreign service, (6) teaching government and social science courses in secondary schools.

History

Courses in history are designed to provide an understanding of man through a study of patterns of development in the past. The study should also give the student an introduction to major problems in world affairs.

A major in history has value to the general student as a humanistic discipline. It has application as preparation for careers in fields of teaching, law, government, journalism, ministry, library and business.

Journalism

The journalism program is concerned with (1) the study of communication problems relevant to the media of mass communication, and (2) the best utilization of the University's liberal education resources by students who plan careers in newspaper work, communications research, public relations, magazine and radio journalism, or some other field of communications.

For such students the journalism courses are intended to provide both increased communication skill and relevant background. The courses may have special value also for students who plan to go into government service, law, education, and similar fields in which knowledge of the process and effects of communication is particularly useful.

The courses emphasize (1) the professional responsibilities of the mass media in a free society, (2) communications research, and (3) study of the reporting of those issues in public affairs which may be evaluated as contemporary history.

Mathematics

The department offers courses designed to furnish a cultural background as well as a foundation for both undergraduate and graduate

work in such fields of science as physics and chemistry, in engineering and in other technical subjects.

The courses recommended for majors in the department are designed to prepare students for high school teaching, graduate study in mathematics, actuarial work, statistical work, or work as engineering aides.

Music

The courses in music are open to all students depending on their training, experience, ability and talent. The department of music supervises and directs the activities of a number of musical organizations which offer opportunities to students for the development of skill in playing, singing, acting, and attitudes for artistic growth. Music courses furnish an understanding of the history and interpretation of music, a knowledge of basic theory, and training in applied music.

The music major student is expected to adjust his elective courses to fit his individual needs in preparation for work in the fields of: Music education, music merchandising, private teaching, the ministry, the armed forces, church music, private school music, kindergarten music, bi-subject teaching, music library administration, music in radio, television, recreation and industry, institutional music therapy, and advanced study in music.

Philosophy

Philosophy seeks a comprehensive understanding of the various areas of man's experience in their interrelatedness. In the context of the historically important theories, the courses concentrate on methods of inquiry into the persisting questions of philosophy, standards of thought, clarification of ethical and aesthetic values, and the basis of criticism.

Physics

The courses give opportunity for the study of basic physical laws. From these courses students may make a selection to satisfy a major in physics, or to comply with requirements for graduate study.

Pre-Medical and Pre-Dental Curriculum

Pre-medical and pre-dental students are assigned to faculty advisers for their freshman year. At the end of their second semester, they will be assigned to a member of the Upperclass Committee

who will be their adviser for the remainder of the course of study.

Pre-veterinary students may register in the College of Agriculture or College of Arts and Sciences. In the latter case, they will be assigned to advisers in the same manner as the other pre-professional students.

Public Health

The Department of Bacteriology, through the cooperation of several departments of the University and the Massachusetts Department of Public Health, offers curricula for (1) a limited number of students interested in the many phases of public health service for which graduate work in medical or engineering schools is not essential; and (2) students planning graduate work in sanitary engineering.

Particular attention will be given to the training of sanitarians, district sanitary officers, food and milk inspectors, water and sewage treatment plant operators, technicians for public health laboratories, and agents for local boards of health.

Psychology

The courses in the psychology department are designed (1) to impart an understanding of behavior and the application of this knowledge to problems of human adjustment; and (2) to give preparation for professional work in psychology and related fields.

Careers open to psychology majors include: Teaching and research, guidance and counseling, psychometrics, child welfare, clinical psychology, school psychology, social work, opinion polling, personnel and industrial work and engineering psychology. Graduate training is required for certain of these careers.

Romance Languages

Two majors are offered: French and Spanish. The courses in these curricula are intended to give rounded and practical knowledge of the languages for the purpose of wider reading, research, and oral communication, leading to a better understanding of all aspects of the intellectual, spiritual, and material attainments of the nations concerned.

Sociology

The courses in sociology are planned with two aims in view:

(1) To give the student an understanding of the factors which influence men in their activities and interests as members of society, and

(2) To prepare those students who are interested in teaching at the elementary or high school level; or those students interested in careers with government agencies; or in careers as social workers with state or private agencies to gain the pre-professional courses necessary before embarking on such careers. Some agencies require work on the graduate level before full-time employment is obtained, while others offer in-training opportunities to graduate majors in sociology. Programs for students interested in teaching are prepared in cooperation with the Education department.

Social Work

The American Association of Schools of Social Work indicates that the pre-professional subjects most closely related to professional work in this field are economics, political science, psychology, and sociology. The Association recommends that prospective students of social work or social administration take not fewer than 12 semester hours in one of these subjects while taking less in others. It also recognizes the value of courses in biology, history, English, as well as other subjects contributing to a broad cultural background for the student.

Speech

The program in speech is planned to serve the students in the entire University who wish training in oral communication, and to provide an opportunity for students in the College of Arts and Sciences to major in speech. Areas of specialization within the major include Rhetoric and Public Address, Oral Interpretation, Theater, Radio and Television.

Zoology

The courses in zoology have two major aims: (1) to offer students an opportunity to develop an understanding and appreciation of the scientific method as a part of a liberal education; and (2) to provide training for prospective graduate students in biology, medicine, dentistry, and related fields, as well as future teachers and laboratory technicians in the biological sciences.

COLLEGE OF AGRICULTURE

DALE H. SIELING, *Dean*

The College of Agriculture with its several departments offers a broad general education with specific training in some phase of agriculture or horticulture. Upon the completion of the requirements for graduation, the student will have devoted about one-quarter of his time to pure science, one-quarter to social and humanistic studies, and about one-half to applied science and technology in agriculture and horticulture.

A broad choice of electives within the required courses of each curriculum gives the student the opportunity to prepare for (1) actual agricultural production; (2) research, teaching, or extension work; or (3) industrial work.

Each department of the school has specific requirements for graduation which are included in the descriptive matter under the name of the department. To prevent overspecialization, each student is required to elect at least 12 junior-senior credits in some other school of the University, one-half of these credits to be in the humanities and social sciences. At least 3 hours must be elected from the following: History 5, 6, 25, 26 or Government 25.

During the first semester of the freshman year, students interested in teaching vocational agriculture, extension work, or specializing in research work, should consult with the head of the department in which they plan to major.

The School comprises the following departments: Agricultural Economics and Farm Management, Agricultural Engineering, Agronomy, Dairy and Animal Science, Food Technology, Forestry and Wildlife Management, Horticulture, Landscape Architecture, Poultry Science, and Veterinary Science. Students may major in any of these department except Veterinary Science and Agricultural Engineering.

Agricultural Economics and Farm Management

The department offers two curricula, one in Agricultural Economics and one in Farm Management, which have been designed to give the student a broad knowledge of the agricultural industry. Production economics, marketing and agricultural business management are the three main fields of study. Associated with these are

training in farm policy, credit, cooperatives and land economics.

A student majoring in this department is prepared for positions with those industries and agencies which serve agriculture; vocational and extension teaching and government service; service or research positions in marketing, credit, or resource use. Agricultural economics majors may specialize in four fields of study; animal products; fruits and vegetables; feeds and fertilizers; lumber merchandising. The major adviser will suggest supporting courses in these fields. The farm management curriculum stresses the economics of production and trains for managerial advisory work as well as for actual operation of farms.

Agricultural Engineering

Agricultural engineering is concerned with the application of scientific engineering principles to agricultural production and related agricultural industries. This professional field includes engineering activities related to the design, development and use of mechanical and electrical equipment; farm structures; and soil and water control systems for the production, processing and preservation of agricultural products and the improvement of rural living. Agricultural engineers are employed by a variety of agricultural industries and organizations for research, development, teaching, and promotional activities.

The program is designed to provide sound training for the agricultural engineering profession. The student majoring in this field will take his freshman and sophomore work at the University and then, under a cooperative agreement, complete his Bachelor of Science program at the University of Maine.

Agronomy

The courses are designed to give instruction concerning the basic knowledge of the soil and its management, fertilizers, and their uses as related to the principal products of the field. Crop improvement practices and the science of crop improvement are stressed for those who are interested in agronomy as a specialty.

There is sufficient flexibility within the curriculum to allow the student to specialize in soil science, plant science, soil conservation or general agronomy. Those students who have a desire to receive training which will qualify them for investigational work in these fields may obtain it by selecting appropriate supporting science or vocational subjects as electives. This training equips them to serve as specialists in one of these selected fields for industrial corporations and may serve also as training for extension or teaching work.

Animal Husbandry

The animal husbandry curriculum is designed to provide the student with fundamental training in the physiology, breeding, nutrition, selection and management of farm animals. The curriculum is made flexible by permitting specialization in optional fields which prepare the student for positions in dairy cattle production and likestock production. An option is also available for those desirous of adequately preparing themselves for graduate work in animal science, including such specialized areas as animal nutrition, physiology or breeding.

Dairy and Animal Science

Major students in dairy technology receive training in the testing, handling, and processing of milk, ice cream, butter, cheese, and other milk products. Practical application is made of chemistry, bacteriology, economics, and engineering in the many phases of dairy work.

Dairy technology graduates may secure responsible positions with commercial dairy manufacturing firms, or with equipment and supply firms. Opportunities are offered also for positions as teachers in high schools and colleges, for service in the fields of extension and research, and for sanitation and public health work with city, state or federal agencies.

Entomology

Courses in entomology serve a variety of functions, such as to give students a broad knowledge of insects, particularly in their relations to man, his crops, his animals, and his health. Students are trained to become entomologists in the service of the United States, or in various state, territorial, or foreign services, especially in the field of agriculture. Other fields of training include forest entomology; medical entomology; control of pests in buildings; research, technical service or sales work with manufacturers of insecticides; teachers of zoology, particularly entomology, at the university level; and various other branches.

Fisheries Technology

An optional curriculum in fisheries technology has been prepared by the Food Technology department. Excellent opportunities exist for employment by federal, state, and private industry in this rapidly expanding field.

Floriculture

The courses in floriculture provide for a comprehensive and detailed study of the practices and principles involved in the production, marketing and uses of cut flowers, flowering and foliage plants grown outdoors and under glass. Opportunities available to graduates may include: Positions in various fields of commercial floriculture, such as production, wholesale marketing and retailing; employment in nurseries, on private estates and in conservatories; positions in the professional field, including graduate study, teaching in colleges and secondary schools, research and extension work under state, federal, or other supervision.

Food Management

The curriculum in food management is offered as an option in the Food Technology department. The program is designed to give the student a general well-rounded background of arts and sciences, coupled with training in subjects useful to the hotel and restaurant industries. The nature of the food service industry requires persons with broad, general backgrounds of business training coupled with a scientific knowledge of foods.

Food Technology

The department of food technology offers three curricula: Fisheries Technology, Food Management, and Food Technology.

The curriculum in food technology provides scientific and applied training in the principles concerned with the processing, preservation, and packaging of foods and food products. Both home and commercial methods of food preservation are considered. Applied work includes canning, freezing, dehydration, fermentation and salting. Methods of manufacture of jams, jellies, fruit juices, and beverages are a part of the course work. An effort is made to apply the student's background in chemistry, physics, and bacteriology to food technology problems and food analysis.

Forestry

The technical curriculum in forestry is concentrated in the field of forest production and management, and leads to the degree of Bachelor of Science. It has professional status, being accredited by the Society of American Foresters. Graduates find good employment with federal and state agencies and in private industry. The curriculum emphasizes forest management and the production and harvest of wood crops.

Landscape Architecture

Instruction in this department has two objectives: first a contribution to general education; second, a preparation of students for the practice of landscape architecture. The department offers optional curricula, (1) Professional Landscape Architecture, and (2) Landscape Operations.

Landscape Operations

The curriculum in landscape operations offered by the department of landscape architecture is suggested for those preferring to following the horticultural phase of landscape including (1) nursery practice; (2) landscape planting and construction; and (3) maintenance of landscaped areas, such as parks and semi-public institution grounds.

Olericulture

The courses in olericulture provide a basic training in the scientific principles and applied practices relative to the culture and marketing of vegetable crops. The major courses prepare students for the operation of commercial vegetable farms; for high school, college, and federal work in teaching, research and extension; for state, federal and private produce inspection work; for various opportunities in the retail and wholesale marketing of perishables; and as service men, specialists, and managers in industrial fields allied to the vegetable industry.

Pomology

The pomology courses provide a comprehensive training in the scientific and commercial principles concerned in the growing and marketing of apples, pears, peaches, plums, cherries, and small fruits. Major fields open to graduates include: (1) practical work in connection with the operation of fruit farms; (2) teaching in college, high school, or secondary schools of agriculture; (3) extension work in county, state, or nation; (4) research work with state, federal or private concerns; and (5) commercial work in connection with the manufacture and sale of such supplies as machinery, packages, and spraying and dusting materials.

Poultry Husbandry

The department gives instruction in the science, art and practices of poultry keeping; not only to students specializing in this

department, but also to those in other departments who desire supporting work in poultry husbandry. The major courses prepare men for the successful operation of commercial poultry and breeding farms and hatcheries either as owners or managers; for high school, college and federal work in teaching, extension and research; and as service men, specialists and managers in industrial fields allied to the poultry industry.

Students must successfully complete one summer of placement training on a poultry farm or in some business allied to poultry.

Veterinary Science

Veterinary Science offers supporting courses to assist students who expect to enter the various fields of agriculture, wildlife management, public health, teaching and laboratory work in the biological sciences or veterinary medicine.

Wildlife Management

The courses in conservation and wildlife management offered by the department of forestry and wildlife management are designed for those who desire a general understanding of the renewable natural resources as well as those who expect to make a living in the professional field of wildlife management. Courses are available also to students who expect to major in other fields including agriculture, agronomy, economics, forestry, entomology, and education.

Wildlife management is both an applied science and an art and is concerned with the production and control of animal populations on many types of land including farms, forests, and on waste lands and water areas. Thus an understanding of both the origin and management of land and water is necessary. These background phases include geology, agronomy, forestry, and agriculture. Fields of specialization include fisheries management, game, and furbearer management and control of injurious animals, and related fields such as soil conservation, conservation education, and industrial biology.

Studies in wildlife management are closely correlated with the work of the State Conservation Department and the U. S. Fish and Wildlife Service. During the junior and senior years trips are planned to the bait-mixing station of the U. S. Fish and Wildlife Service, the John C. Phillips Wildlife Laboratory at Upton, Mass. and to numerous wildlife projects in the state. Students are urged to attend the northeastern and the American wildlife conferences.

SCHOOL OF BUSINESS ADMINISTRATION

H. B. Kirshen, *Dean*

The School of Business Administration offers preparation to students to enable them to take advantage of important economic opportunities and eventually to assume positions of responsibility in business. The School's educational program is directed toward the professional aspects of business, encouraging high standards of ethical conduct, broad social responsibilities and the development of competence in particular courses of study of the student's own interest, aptitude and choice.

The first two years emphasize general education by providing fundamental courses in the humanities, mathematics, science and social science. In addition, basic courses in accounting and economics prepare the student for further work in the School of Business Administration. The first two years are largely prescribed.

The junior and senior years emphasize a greater degree of specialization and provide for this in the programs indicated below. But even in these last two years all students need to view business as a whole in so far as a "core" of courses can do this. All students are required to complete specified courses in Management in Industry, Financial Institutions, Marketing Principles, Corporation Finance, Elementary Statistics and Business Law.

Each course of study leads to the degree of Bachelor of Business Administration.

MAJORS

General Business

This program is designed for those students more interested in the broader administrative aspects of business than in a more specialized program.

Accounting

Accounting deals with the problems of measuring, recording, reporting and interpreting business transactions. This program is for the student who wishes to prepare for employment as auditor, controller, cost analyst, industrial accountant, public accountant, or teacher of accounting.

BUSINESS ADMINISTRATION

Finance

Courses in banking, finance and insurance are provided for students who expect to assume responsibility for financing a business or to work for banks, investment institutions, brokerage houses, insurance companies, or governmental agencies concerned with finance.

Management

Industry offers to qualified students an opportunity to find satisfying careers in industrial management, or personnel management. The program offered is designed to give the student specialized training in these fields and a comprehensive understanding of the problems of industrial enterprises.

Marketing

Students in marketing prepare for a variety of occupations in wholesale and retail enterprises and the sales activities of manufacturers. The program offers specialized study of basic types of market operations.

Merchandising

This program has been planned to meet the growing demand for women with technical training to fill positions of responsibility in retail merchandising.

SCHOOL OF EDUCATION

A. W. Purvis, *Dean*

The School of Education through its undergraduate program seeks to utilize the forces of the University to prepare teachers for elementary and secondary schools and through its graduate offering to prepare administrators and specialists in public education. Its program is based upon the assumption that teachers and other school personnel should have a broad liberal education, considerable mastery of at least one field, and professional courses which should lead to a knowledge of the persons to be taught, familiarity with the problems to be met, and practice in the best techniques of teaching and supervision. In all of this the School of Education takes the position that teacher training is a University function and that success will come only if the School is successful in maintaining the closest possible relationships with other schools and departments that contribute to the program.

All students who contemplate teaching as a career should register early, in their freshman year if possible, with the School of Education although their courses in education do not begin until the junior year. In general, students are admitted without question to the various service courses of the junior and senior years, but admission to the teacher-training program of the concentrated semester block is determined by a composite rating based on scholarship as shown by University grades (a three-year average at least as high as the University median is desired), success in the beginning courses in education, recommendations of University teachers in general education fields, and personality ratings by members of the staff.

Elementary School Teaching

Candidates for this program major in elementary education. In certain cases, with the approval of the Dean of the School of Education, the student may be permitted to major in some other school or department where the general education program is deemed the equivalent of that for elementary education majors. Such students will satisfy the requirements of their major department so far as the first two years are concerned but they should schedule the core professional program for elementary education majors (including the concentrated elementary block) in the junior and senior years.

Secondary School Teaching

All candidates for secondary school teaching will major in the subject field to be taught and minor in education.

Special Field Programs for Prospective Teachers

In Vocational Agriculture (C. F. Oliver, adviser). This program is based on a cooperative agreement between the University and the Vocational Division of the State Department of Education which provides supervisors and consultants in conducting the program.

SCHOOL OF ENGINEERING

G. A. Marston, *Dean*

The departments of chemical engineering, civil engineering, mechanical engineering and electrical engineering comprise the School of Engineering. Each department offers a curriculum leading to a Bachelor of Science degree in that particular branch. An optional curriculum in industrial engineering is offered in the mechanical engineering department.

The civil, electrical, mechanical, and the industrial optional curricula have been accredited by the Engineers Council for Professional Development.

Engineering can be defined as the combination of science and art by which materials and power are made useful to mankind. An engineer requires intensive technical training but at the same time he should acquire the broad education that distinguishes the professional man from the technician. His education does not end with formal schooling but continues throughout his life as he accumulates experience.

The curricula in engineering have been carefully prepared to offer each student the opportunity to acquire a sound training in the fundamental work of the various branches of his chosen field. At the same time he receives a thorough training in the sciences and mathematics, which are the important tools of the engineer. About twenty percent of his time is devoted to the social and humanistic studies. Some opportunity to pursue his particular interest is offered in the senior year.

The curriculum of the freshman year is the same for all. Specialization to a limited extent begins in the sophomore year.

MAJORS

Majors in Engineering will select one of the following curricula.

Chemical Engineering

Chemical engineering is that branch of engineering concerned with the development of manufacturing processes in which chemical or certain physical changes of materials are involved. These processes may usually be resolved into a coordinated series of unit operations (physical changes) and unit processes (chemical changes). The

work of the chemical engineer is primarily concerned with the design, construction, and operation of equipment and plants in which series of these unit operations and processes are applied. Chemistry, physics, and mathematics are the underlying sciences of chemical engineering, and economics is its guide in practice.

Chemical engineers are employed not only in those industries manufacturing chemicals but in many others where there occur chemical changes and physical changes other than forming and shaping which is the province of mechanical engineering. Examples are: petroleum refining, coal processing, refractories and clay products, cement, waste treatment, pulp and paper, rayon and textiles, paint and varnish, natural and synthetic rubber, foods, leather, plastics, soap, penicillin and other antibiotics. Much of the work of the atomic energy program is chemical engineering. The types of work done by chemical engineers include: design, construction, research, development, production, financial and patent appraisal, management, and sales.

Civil Engineering

Civil engineering is concerned with structures, transportation, movement of fluids, use and storage of water, sanitation, and surveying and mapping. A civil engineer may be engaged in research, in planning and designing, in construction, or in maintenance and operation. Consequently, civil engineering contains room for a wide range of interests—from highly theoretical to very practical.

The curriculum gives a thorough training in the fundamental sciences and at the same time prepares a student for work in any branch of civil engineering. During his senior year a student takes two or three elective technical courses, allowing him to specialize to some extent in whatever branch of civil engineering is most interesting to him—sanitation, mechanics and structures, hydraulics, foundation engineering, highway engineering.

Electrical Engineering

Electrical engineering is that branch of the profession covering the engineering applications of electricity. It reaches into practically every profession, every branch of activity, either through performance of the tasks involved, or through their measurement and control. Because it is so diversified in its applications, it is considered to be divided into various fields such as power, communications, electronics, illumination, measurements and control and others, each of these having specialized subdivisions.

The undergraduate curriculum is designed to prepare the student for work in any of these fields, and to serve as a basis for specialization in any of them, either in advanced courses or in the field. At the same time, about one-fifth of the student's work is devoted to the humanistic-social courses so that he may have an understanding of the broader aspects of engineering and its relation to other fields of human endeavor.

Mechanical Engineering

Mechanical engineering is that branch of the profession which, broadly speaking, covers the fields of heat, power, design of machinery, industrial management and manufacturing problems.

Building upon the foundation laid by the departments of mathematics, physics, and chemistry, the department of mechanical engineering undertakes to show the student how fundamental physical laws apply to this field of the profession. The courses selected give the student thorough training in the basic principles so that particular applications can be mastered in professional practice. Therefore, no attempt is made to give highly specialized instruction.

It must be realized that the modern engineer lives in a time of rapid social and technological change. Only the man who has had a well-balanced cultural and technical program of study can adjust quickly enough to the needs of a continually changing social order. The curricula emphasize the fundamentals of the four M's of engineering: materials, methods, men, and money, a knowledge of which is vital to the modern engineer.

Industrial Engineering Option

Industrial engineering is concerned with the engineering aspects of the organization, operation and management of manufacturing plants. It is based on the premise that the operation of a manufacturing plant is fundamentally an engineering activity. Consequently, the industrial engineering curriculum is built on a foundation of mechanical engineering. To the technical knowledge and scientific attitude developed through the study of engineering is added the study of certain courses in the humanities, in economics, and in management.

SCHOOL OF HOME ECONOMICS

HELEN S. MITCHELL, *Dean*

The four-year integrated program in home economics prepares young women for challenging professional careers as dietitians in hospitals, clinics, hotels, in other institutions and as community nutritionists. Various opportunities are open in extension service, in family welfare organizations, in business and industry, where manufacturers and public utilities require the services of qualified home economists. Fashion, textiles, merchandising and retailing, journalism, advertising and television frequently turn to the home economist for their personnel. Home economics education prepares teachers for preschool, secondary and adult teaching programs.

In addition to preparation for a career in one of these professions, the graduate home economist has developed an appreciation of the knowledge, understandings, attitudes and skills essential to the complex role of modern women in homemaking and community life, in the dual role of marriage combined with a career now or in later years.

Child Development and Family Life Education

Students interested in child development, nursery school work and social service work may choose this curriculum. The University has arranged for two affiliations for qualified students interested in taking one semester of specialized work elsewhere: with Merrill-Palmer School in Detroit, which specializes in education for home and family life, and with the Eliot Pearson School in Boston which gives professional training for teaching in nursery schools and kindergartens.

Foods and Nutrition and Institutional Administration

This curriculum prepares for such professions as therapeutic and administrative dietitian, or nutritionist, and meets the requirements of internships approved by the American Dietetic Association. This basic curriculum is also advised for those interested in home service, food testing, commercial food demonstrating; commercial, industrial and institutional food service.

Pre-Research in Nutrition

This curriculum is planned for the students who wish to prepare for graduate work in nutrition or biochemical research. The course should be planned with the advice of the Dean of the School.

Home Economics Education and Extension

Preparation for teaching demands the same basic courses whether a student plans to teach adults or 4-H Club groups in Extension, or young people at the high school or junior high school level. Teachers should be ready to teach some subject other than home economics if demanded; extension workers need special work in rural sociology and adult education. Courses in speech and writing are important. Camp teaching or apprentice training is recommended between junior and senior year.

Merchandising

This curriculum provides an opportunity for girls interested in preparing for the merchandising field. The junior and senior curriculum includes courses in home economics and in business administration and should be planned with the faculty adviser by the end of the freshman year if possible. Students choosing this program should plan on at least a year of in-service training after college. If the interest is primarily in business, see the Merchandising major under the School of Business Administration.

SCHOOL OF NURSING

MARY A. MAHER, *Dean*

The basic professional nursing program is designed to prepare qualified high school graduates for a career in professional nursing, for marriage and family living. It aims to equip the student with those understandings, attitudes, skills and appreciations which are essential for a competent practitioner and health teacher.

The program is planned specifically to help the student increase her self-understanding so that she may function constructively and creatively in her personal and professional relationships; enhance and improve her emotional, physical, social and spiritual well-being; extend her understanding of the health needs of the individual and family and of the community organizations primarily concerned with the promotion of health and prevention of illness; improve her professional competency as she ministers to the individual and the family in selected clinical situations; more fully understand and appreciate her role in the nursing, the therapeutic and the health team; become sensitive to the need and responsibility for periodic appraisal and improvement of professional nursing practice; become a more self-directive and responsible member of the profession and of the community; and improve her professional competency through continued study.

The graduate of such a program is ready for a beginning position in a variety of nursing situations, including public health; for leadership in the hospital nursing team; and for participation with allied personnel in providing comprehensive patient care. A foundation is laid for advanced study, through which the nurse may prepare for positions in teaching, supervision, administration, consultation and research.

During the first two academic years at the University, the student builds an educational foundation upon which to base the more specialized portion of the program. Courses in the humanities and in the sciences—biological, physical and behavioral—are taken with other students on the campus.

The clinical aspects of the program are developed in the next two and one half years, when instruction and correlated clinical practice is given in selected cooperating agencies by the nursing faculty of the University and allied professional staffs of the cooperating agencies. These agencies include: the Springfield Hospital; the Wesson Maternity Hospital, Springfield; the Visiting Nurse

Association of Springfield; the Springfield Health Department; the New England Medical Center, Boston; and the McLean Hospital, Waverly.

The student returns to the campus for a fifth academic semester, upon completion of which a Bachelor of Science degree is awarded. This qualifies the graduate for State Board Examinations in Nursing. If achievement in these examinations is satisfactory, the candidate receives legal status as a registered nurse within the state.

DIVISION OF MILITARY AND AIR SCIENCE

The Division of Military and Air Science includes the Department of Military Science and the Department of Air Science. The two departments, though having varying specific missions, are grouped into one academic division. No major is offered in the division, but students in other divisions may take up to 16 semester hours of credit within the Division of Military and Air Science.

The Basic Course (Army or Air) is a one credit course per semester in the freshman and sophomore years, required of all physically qualified male students, except veterans, who intend to complete the necessary requirements leading to a degree in any four-year course at the University. The choice of service, Army or Air Force, must be made by each student when he initially enrolls. The student in the Basic Course is provided with a uniform of the service in which he is enrolled. A deposit of $30.00 is required to cover the cost of loss or damage to any of the articles issued.

Military Science (Armor)

The purpose of the Department of Military Science, as a part of the Army Reserve Officers Training Corps, is to train college students for positions of leadership in the United States Army during times of national emergency.

Following the Basic Course of elementary military instruction in the first two years, the Army ROTC program offers an advanced course for those who wish to continue on to a commission. This course, which stimulates the growth of the leadership potential in the individual, is elective; however, only those students possessing outstanding military and scholastic aptitude and sound moral character are selected for continuance in the program.

The objective program is the development of young officers suitable for a career of service in the United States Army. In achieving this goal, the ROTC program provides the student not only with a foundation of military knowledge and skills, but with an awareness and appreciation of this nation's historic role in the world of today.

The student who is enrolled in the Advanced Course is allowed $100. toward the purchase of an officer's uniform which becomes his property upon successful completion of the course. In addition, each cadet is paid about $27. a month throughout the junior and senior years. During the summer between the junior and senior years, cadets attend ROTC Summer Camp for six weeks, for which

they receive pay at the rate of $78. a month in addition to clothing, medical care, and room and board. The student usually attends a summer camp operated by the branch of service in which he will ultimately be commissioned.

Air Science

The mission of the Department of Air Science program is to develop in selected college students through a permanent program of instruction those qualities of leadership and other attributes essential to their progressive advancement to positions of increasing responsibility as commissioned officers in the United States Air Force. It is not expected that all so commissioned will select the USAF as a career. Nevertheless, the AFROTC program does offer an excellent means to prepare for a career in the USAF.

The AFROTC program is further designed to increase the student's ability to understand and evaluate national and world affairs in the Air and Space Age by giving him a new perspective on international developments, the place of civilian and military aviation in the U. S. economy, and the importance of air power in the defense of the nation.

DIVISION OF PHYSICAL EDUCATION

W. P. McGuirk, *Head*

The Division of Physical Education includes the Department of Physical Education for Men, Physical Education for Women, Recreational Leadership, and Athletics. It offers a major in Physical Education for Men, Physical Education for Women, and in Recreational Leadership for men and women.

GENERAL PROGRAM

Each male freshman and sophomore student is required to successfully complete four semesters of physical education and demonstrate his ability to swim as a requirement for his degree, unless exempted under the following conditions. The physical education requirement does not apply to those students excused by the University physician; veterans of military service; and certain transfer students.

Students may receive credit for physical education, during the sport in season, by becoming a squad member of any freshman or varsity team. Freshmen students who elect an athletic team sport for physical education credit must rejoin their class section at the termination of the seasonal sport. Students may not participate in a given sport for credit for more than two semesters.

In fulfilling the requirements all students must have participated in three team sports, four individual activities and aquatics.

MAJOR PROGRAMS

Physical Education for Men

The major program leading to the degree of Bachelor of Science in physical education is designed to train the student for a career as a teacher of physical education. The curriculum combines both general and professional education and provides for full teacher certification for the student who has met the prescribed requirements of preparation. The program also provides for adequate training in a minor area of teaching, elected by the student, including the coaching of inter-school athletics.

Physical Education for Women

Women may major in physical education to prepare for teaching and administrative positions. The curriculum includes sciences, social studies, professional courses and opportunity for specialization in dance, sports and health education. Skills and teaching methods are learned in team sports, individual sports, aquatics, gymnastics and dance.

Recreation Leadership

The department seeks to prepare students for positions involving administrative, supervisory, and program leadership responsibilities in municipal recreation agencies, voluntary and youth-serving agencies, hospitals, and industrial and institutional organizations. Students who plan a career in recreation should register as early as possible with the department.

The program is designed to provide opportunities for a broad liberal education, a knowledge and understanding of people and society, activity skills and resource knowledge, professional competency, and practical experience in various leadership situations.

RELIGION

Chaplains Power, Ruchames, and Seely, *Advisers*

The courses in the history of religion, the articles of belief and the application of religious principles are given by the Chaplains of the three major western faiths and by others designated by the churches represented. They are financially independent of the University although the facilities of the University are available as for other courses.

Courses are offered in this field for the sake of the student who is interested in rounding out his educational program with the acquiring of a mature perspective in religion. The opportunity is offered for the student to gain a wide knowledge of the forces which have been basic to his culture, an understanding of the religious influences in his own life, and an evaluation of the part that religion plays in current social movements.

Students register for these courses at the regular registration period and may do so in addition to a normal semester load. No academic credit accrues from participation in the courses in religion.

UNIVERSITY BUILDINGS

Today's campus at the University of Massachusetts, with well-established and seasoned buildings is marked by an energetic expansion of existing facilities and construction of modern laboratories, classrooms and dormitories to meet an enrollment of 10,000 by 1965.

Existing buildings housing chemistry and the library will be doubled in size by new additions. Old wooden buildings are gradually being replaced by sturdy brick and concrete.

For the past five years, the Massachusetts Legislature has shown increased interest in supporting the capital outlay requests of the Board of Trustees by appropriating millions of dollars for buildings to educate Massachusetts youth.

A Master Plan of expansion has been drawn by a Boston engineering firm and for the first time, a formal chart of growth has been recorded in a new publication, The Master Plan.

During its 1957 session, the Massachusetts Legislature appropriated nearly eight million dollars for the University budget. Since 1947, over $25,000,000 has been appropriated for buildings.

A unique plan of financing covers an important area of University building needs, the University of Massachusetts Building Association. Originated by a group of alumni, private investors and students directly support and operate income-producing buildings, including dormitories, faculty apartments and the Student Union. Under this plan, private investors supply the necessary investment for construction of the building while fees from students maintain the buildings and will eventually liquidate the long-term bonds.

Construction has begun on new junior faculty and married student housing and completion date is scheduled for the Fall of 1958.

The College Pond is the center of the campus, and long range plans call for its preservation as a scenic highlight of the central campus.

An alphabetical list of buildings follows:

Abigail Adams House. Women's Dormitory for 100 students. Erected in 1919 and named for Abigail Adams, wife of John Adams, second president of the United States.

Alumni Field. Funds and labor for its construction were contributed by alumni and students. Included are two baseball diamonds; three practice football fields; two soccer fields; a Lacrosse field and a cinder track. Twenty-four tennis courts are adjacent.

BUILDINGS

Arnold House. Women's dormitory for 205 students. Constructed in 1954 by the U. Mass. Building Association and named in honor of Sarah Louise Arnold, former trustee of the University.

Baker House. U. Mass. Building Association dormitory for 360 men. Erected in 1951 and named in honor of Hugh P. Baker, University president from 1933 to 1947.

Bowditch Lodge. Headquarters for 4-H Club activities. Built in 1936 with funds contributed by 4-H Club members, friends, and organizations. Named for Nathaniel Bowditch, trustee of the University from 1896-1945.

Brooks House. U. Mass. Building Association dormitory for 180 men. Named in honor of William Penn Brooks, professor of agriculture and Director of the Experiment Station, 1888-1921.

Butterfield House. U. Mass. Building Association dormitory for 147 students with a dining hall. Named for Kenyon L. Butterfield, President of the University from 1906-1924.

Chadbourne House. U. Mass. Building Association dormitory for 150 men. Built in 1946 and named for Paul Ansel Chadbourne, President of the University from 1866-67 to 1882-83.

Chenoweth Laboratory. Classrooms and laboratories including Commercial Practice Laboratory for the Department of Food Technology. Erected 1929 and named in honor of Walter W. Chenoweth, pioneer in the field of Food Technology and first Head of the Department.

Clark Hall. Offices, lecture rooms, laboratories, and greenhouses of the Department of Botany are located here. The herbarium contains about 122,000 sheets of seed plants and ferns, 5000 sheets of liverworts, mosses, algae, lichens, and a collection of 20,000 specimens of fungi. The building was erected in 1906 and named in honor of William S. Clark, President of the University and Professor of Botany from 1867 to 1879.

Conservation Building. Formerly the Old Botany Museum, erected 1867. Houses laboratories, classrooms and offices for the Department of Forestry and Wildlife Management.

County Circle. Five residence halls erected in 1948 by the Commonwealth. Hampshire and Suffolk Houses contain 30 two-room and three-room apartments for married persons and their families. Plymouth, Berkshire, and Middlesex Houses contain dormitory rooms for approximately 144 students each.

Crabtree House. U. Mass. Building Association dormitory housing 154 students, completed in 1953. Named for Lotta Crabtree, benefactress of the University.

Dining Commons. Central University dining commons for men and women students.

Dramatic Workshop. Headquarters for instruction in stagecraft.

Draper Hall. Classrooms and offices of the School of Business Administration; also department of agricultural economics and farm management. Erected in 1903 and renovated in 1954. Named in honor of James Draper, for 20 years a Trustee of the University.

Durfee Conservatories. New Durfee Conservatories were erected in 1954. They contain collections of plants of various types, including desert, tropical and sub-tropical, botanical and horticultural importance. These greenhouses replace the Durfee Planthouses erected in 1867 from money given by Dr. Nathan Durfee of Fall River, Treasurer of the Board of Trustees.

East Experiment Station. Houses operations of the Bureau of Government Research.

Engineering Annex. Laboratories, classrooms, and offices for the School of Engineering. Erected in 1948.

Engineering Building. First wing completed in 1950 provides laboratories for industrial electronics, communications, ultra high frequency, electrical measurements, illumination and metallurgy, as well as classrooms and offices for the School of Engineering. Building completed in 1955. Addition contains laboratories for civil engineering in soil mechanics, sanitary engineering, applied mechanics and structural engineering, industrial engineering laboratories for time and motion studies and work simplification. New metallurgical facilities include new processing laboratory, X-ray and non-destructive testing equipment. Mechanical engineering and the School of Engineering laboratories are also housed here. The University radio studio, together with its transmitter are housed on the first floor and the campus weather station will be located on the third floor. This building serves also as temporary headquarters for the School of Nursing and contains office space for several members of the history department.

Farley 4-H Club House. Headquarters for 4-H Club activities. Erected in 1933 by funds contributed by 4-H Club members and interested friends and organizations. Named to honor George L. Farley for 25 years State Leader of County Club Agents.

Farm. In the University barns are maintained Percheron and Morgan horses; Aberdeen-Angus, Ayrshire, Guernsey, Hereford, Jersey and Holstein cattle; Shropshire and Southdown sheep and Chester White swine. The University farm is operated as a livestock farm, producing all its necessary roughage in the form of pastures, hay and silage and a portion of its required grain.

Fernald Hall. Erected in 1909 and named in honor of Professor Charles H. Fernald who served the University from 1886 to 1909, built a strong Department of Zoology, created the Department of Entomology, and acted as Director of the Graduate School. Fernald Hall houses the Departments of Entomology and Geology and offices and classrooms of the Department of Zoology. Offices and laboratories of the Western Sanitary District, Massachusetts Depaprtment of Public Health, are also located here. The Entomology collection includes over 160,000 insects. There are also Geological and Zoological museums.

Fisher Laboratory. Erected in 1910 and named for Jabez Fisher, one of the foremost early horticulturists of the state. Laboratories for Pomology are located here, including a quick freezing room, six refrigerator rooms, two rooms for the storage of frozen prducts, two classrooms, and three packing rooms.

Flint Laboratory. Laboratories and classrooms for dairy and animal science. Erected in 1911 and named for Charles L. Flint, fourth president of the University.

French Hall. Built in 1908 and named for Henry F. French, first president of the University. This building houses the Departments of Floriculture, Pomology and Olericulture. In the rear of the building are the Edward A. White greenhouses, built in 1908, enlarged in 1939 and devoted to cultivation of carnations, roses and chrysanthemums. One house is maintained as a conservatory and contains a collection of decorative plants.

Goessmann Chemistry Laboratory. Nearly completed is the addition to the original building built in 1924 and named for Charles A. Goessmann, first professor of chemistry. The present facilities of eight large laboratories, auditorium, library and lecture rooms will be doubled.

Goodell Library. The main collection of the University Library is housed in the Goodell Library building, a brick building erected in 1935 and named in honor of Henry Hill Goodell, who served as President and Librarian from 1886 to 1905.

Construction of a 2 million dollar addition begun during the winter of 1958 will double the existing capacity.

The library contains the main book and periodical collection of the University library system which now totals over 200,000 volumes and is growing at the rate of over 8,000 volumes per year. The Library subscribes to over 1,000 periodicals and serials of learned societies. It is also a designated depository for federal government publications including particularly those of the United States Department of Agriculture.

The main collection includes the books and periodicals in the humanities and social sciences, together with some of the book material in the natural, physical, and applied sciences.

In the Goodell Library building is the central card catalog. The main floor includes a large reading room, a reference room, circulation desk, reference and current periodical desk, both in the main lobby, and cataloging and administrative offices. On the second floor is another large reading room. There is a study for faculty and a University History Room in memory of Dean William L. Machmer in which the historical records of the University are kept and exhibited.

Besides the Goodell Library there are 32 departmental libraries totaling about 38,000 books and bound periodicals located in the several University buildings with the teaching departments and laboratories. These libraries vary from small working libraries to extensive collections in special fields. Particularly worthy of note are the botany, chemistry and entomology libraries.

Greenough House. U. Mass. Building Association dormitory for 148 men students, with dining hall. Erected in 1946 and named in honor of James Carruthers Greenough, president from 1883-1886.

Grinnell Arena and Abattoir. Built in 1910 for livestock judging. The abattoir was constructed in 1930. Named in honor of James S. Grinnell, for 22 years a University Trustee.

Gunness Engineering Laboratory. Laboratories for industrial combustion engines, material testing, fluid mechanics, heating, air conditioning and refrigeration, electrical machinery, electrical circuits. Built in 1948, it is named in honor of Christian I. Gunness, professor of agricultural engineering from 1914 to 1946.

Hamlin House. U. Mass. Building Association dormitory for 175 women, built in 1949 and named for Margaret P. Hamlin, first placement officer for women, serving from 1919 to 1948.

Hasbrouck Physics Laboratory. Completed in 1949. Contains laboratories and lecture rooms designed for the various main divisions of physics. Named in honor of Philip B. Hasbrouck, Professor of Physics and Registrar of the University during the period 1905 to 1924.

Hatch Laboratory. Laboratory where small animals and chickens are used in connection with investigations into human, animal and poultry nutrition.

Curry S. Hicks Physical Education Building. Erected in 1931 from funds contributed by alumni and friends of the University, supplemented by an appropriation from the Legislature. Houses a swimming pool, exercise hall, basketball courts and locker rooms. It is named for Curry S. Hicks, professor and head of the division from 1911 to 1949.

Homestead. Women majoring in home economics receive home management practice in this colonial home, newly-equipped with homemaking conveniences.

Infirmary. Three buildings, assigned for bed patients, out-patients and an isolation building.

Knowlton House. U. Mass. Building Association Dormitory for 175 women students. Erected in 1950 and named in honor of Helen Knowlton, associate professor of Home Economics, 1924-1941.

Leach House. U. Mass. Building Association dormitory for 154 women. Built in 1953 and named in honor of Mrs. Joseph A. Leach, chairman of the Women's Advisory Council and a former trustee. French House is located here and majors in French together with a French-speaking resident develop conversational fluency.

Lewis House. U. Mass. Building Association dormitory for 150 men. Built in 1940 and named in honor of Edward M. Lewis, Dean from 1914 to 1925 and President, 1925-1927.

Liberal Arts Annex. A temporary structure housing offices for psychology and military science. Construction is scheduled to begin in 1958 of a new Liberal Arts Classroom.

Machmer Hall. A $1,000,000 classroom building, providing offices and instruction facilities for the departments of economics, education, German, government, mathematics, philosophy, Romance languages and sociology. Named for William Lawson Machmer, Dean of the University from 1926 to 1953.

Marshall Hall. Erected in 1915 and named for Dr. Charles Marshall, a former Professor of Bacteriology and Director of the Graduate School. Building provides laboratories and classroom space for the department of bacteriology and the department of zoology.

Mathematics Building. Temporarily housing offices of speech department and research facilities for geology.

Memorial Hall. Erected in 1921 by alumni and friends in memory of those men who died in World War I. Included is a Memorial Room in which the names of those members of the University family who died in the service of their country are appropriately enshrined. This building houses the alumni headquarters, also the department of music.

Mills House. U. Mass. Building Association dormitory for 150 men students. Erected in 1948 and named in honor of George F. Mills, teacher of English from 1890 to 1914 and Head of the Division of Humanities.

Munson Hall. Headquarters for the Division of Youth Work (4-H) and Department of Agricultural Communications. Named in honor of Willard A. Munson, a graduate of the University in 1905 and Director of the Extension Service from 1926 to 1951.

Old Chapel. Erected in 1885. Auditorium, seminar room, classrooms and offices for English and history.

Paige Laboratory. Erected in 1950 and named in honor of James B. Paige, a graduate in the class of 1882 and Professor of Veterinary Science from 1891-1922. The building contains classrooms and laboratories. Laboratories for State Control and research work in animal diseases are also located here.

Poultry Plant. Consisting of a number of modern buildings, in which instruction and research in ventilation, breeding, feeding, incubation, brooding, marketing and management of poultry and poultry enterprises take place. Rhode Island Reds, Barred Plymouth Rocks, White Plymouth Rocks, New Hampshires and S. C. White Leghorns and several other breeds are maintained here on a commercial basis.

Power Plant. General maintenance of the University.

Shade Tree Laboratories. Constructed in 1948 for research on shade tree problems, including Dutch Elm Disease.

Skinner Hall. Laboratories, classrooms and offices for the School of Home Economics. Erected in 1947 and named in honor of Edna L. Skinner, first Dean of the School of Home Economics.

South College. Administration building, including offices of President, Treasurer, Provost, Secretary, Registrar, Dean of Arts and Sciences, Dean of Graduate School, Director of Placement Service, Dean of Women, Dean of Men, and Director of Publications. Erected 1885.

Stockbridge Hall. Administrative offices of the College of Agriculture and the department of agronomy, animal husbandry and poultry husbandry are located here. Erected in 1914 and named for Levi Stockbridge, first professor of agriculture and former president of the University. Bowker Auditorium, the main auditorium on the campus, is also located here. It is named for William H. Bowker, a member of the first graduating class, Trustee of the University, and one of the pioneers in the fertilizer industry.

Stockbridge House. One of the oldest houses on campus, this early-American homestead serves as the center for Faculty Club activities.

Student Union. The largest of the U. Mass. Building Association projects, this million dollar structure of contemporary design is supported entirely by private investment with student fees providing operating income. The Union houses a ballroom-auditorium; offices for student activities; University store; coffee shop; barber shop; bowling alleys and billiard room; chaplains' office; lounges and small dining rooms.

Thatcher House. Women's dormitory for 150 students. Erected in 1935 and named in honor of Roscoe W. Thatcher, President from 1927-1932.

Van Meter House. U. Mass. Building Association dormitory for 300 men students. An addition was completed in 1957. It was named for Ralph A. Van Meter, 13th president who retired in 1954.

West Experiment Station. The State Control Service is centralized here. Feeds, fertilizers, and seeds are analyzed or inspected in accordance with state law. Erected in 1886.

Wilder Hall. Contains classrooms, drafting rooms and offices of the department of landscape architecture. Erected in 1905 and named for Marshall P. Wilder, a pioneer in the movement of agricultural education in Massachusetts, and one of the University's first Trustees.

Wildlife Laboratory. Laboratories for graduate students in wildlife management.

Women's Physical Education. A $2,000,000 building recently completed housing gymnasium, swimming pools, and archery range.

THE UNIVERSITY OF MASSACHUSETTS *Bulletin*

GRADUATE SCHOOL • 1959-1961

Bulletin

THE UNIVERSITY OF MASSACHUSETTS

Graduate School

1959 - 1960

1960 - 1961

The Graduate School Catalog for the sessions of 1959-1960, 1960-1961 is part of the Ninety-Fourth Annual Report of the University of Massachusetts and in conjunction with the general catalog of The University it constitutes Part II of Public Document 31 (Sec. 8, Chapter 75, of the General Laws of Massachusetts).

AMHERST, MASSACHUSETTS

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ACADEMIC CALENDAR

1958-59

January 5, Monday	Last day on which thesis outlines may be handed in by Master's degree candidates who plan to finish their work by the 1959 Commencement.
January 10, Saturday, 12:00 noon	Classes stop.
January 12, Monday, through January 20, Tuesday	Final examinations.
January 28, Wednesday	Registration of graduate students.
January 29, Thursday, 8:00 A.M.	Classes resume.
February 23, Monday	Washington's Birthday; a holiday.
March 20, Friday	Last day on which graduate students may drop courses without failure.
March 21, Saturday, 12:00 noon to March 31, Tuesday, 8:00 A.M.	Spring recess.
April 20, Monday	Patriot's Day; a holiday.
April 22, Wednesday	Counseling Day; no scheduled classes.
April 24 or 25, Friday, Saturday	Ph.D. language examinations.
May 22, Friday, 8:00 A.M. to 5:00 P.M.	Monday classes will meet.
May 22, Friday, 5:00 P.M.	Classes stop.
May 25, Monday, through June 3, Wednesday	Final examinations.
May 30, Saturday	Memorial Day; a holiday.
June 3, Wednesday	Last day for bound theses to be handed in.
June 5, Friday, through June 7, Sunday	Commencement.

ACADEMIC CALENDAR

1959-60

September 10, Thursday	Registration of graduate students.
September 11, Friday, 8:00 A.M.	Classes begin.
October 1, Thursday	Last day on which Ph.D. candidates who plan to complete their work by the June, 1960 Commencement may take the preliminary comprehensive examination.
October 12, Monday	Columbus Day; a holiday.
November 2, Monday	Last day on which graduate students may drop courses without failure.
November 11, Wednesday	Veterans' Day; a holiday.
November 25, Wednesday, 12 noon to November 30, Monday 8:00 A.M.	Thanksgiving recess.
December 4 or 5, Friday, Saturday	Ph.D. language examinations.
December 19, Saturday, 12 noon to January 4, Monday, 8:00 A.M.	Christmas recess.
January 4, Monday	Last day on which thesis outlines may be handed in by Master's degree candidates who plan to finish their work by the 1960 Commencement.
January 14, Thursday, 5 P.M.	Classes stop.
January 16, Saturday, through January 23, Saturday	Final examinations.
February 2, Tuesday	Registration of graduate students.
February 3, Wednesday, 8:00 A.M.	Classes resume.
February 22, Monday	Washington's Birthday; a holiday.
March 21, Monday	Last day on which graduate students may drop courses without failure.
April 14, Thursday, 5:00 P.M. to April 25, Monday, 8:00 A.M.	Spring recess.
April 29 or 30, Friday, Saturday	Ph.D. language examinations.
May 26, Thursday, 5:00 P.M.	Classes stop.
May 28, Saturday, through June 6, Monday	Final examinations.
May 30, Monday	Memorial Day; a holiday.
June 8, Wednesday	Last day for bound theses to be handed in.
June 10, Friday, through June 12, Sunday	Commencement.

ACADEMIC CALENDAR

1960-61

September 8, Thursday	Registration of graduate students.
September 9, Friday, 8:00 A.M. . . .	Classes begin.
October 6, Thursday	Last day on which Ph.D. candidates who plan to complete their work by the June, 1961 Commencement may take the preliminary comprehensive examination.
October 12, Wednesday	Columbus Day; a holiday.
November 1, Tuesday	Last day on which graduate students may drop courses without failure.
November 11, Friday	Veterans' Day; a holiday.
November 23, Wednesday, 12:00 noon to November 28, Monday, 8:00 A.M. . .	Thanksgiving recess.
December 2 or 3, Friday, Saturday . . .	Ph.D. language examinations.
December 21, Wednesday, 12:00 noon to January 4, Wednesday, 8:00 A.M. . . .	Christmas recess.

THE TRUSTEES OF THE UNIVERSITY

Organization of 1958

Members of the Board

	Term Expires
Dennis Michael Crowley of Boston	1959
Francis Roland McDermott of Wrentham	1959
Frank Learoyd Boyden of Deerfield	1960
Ralph Fred Taber of West Newton	1960
Harry Dunlap Brown of Billerica	1961
John William Haigis, Jr., of Greenfield	1961
Joseph Warren Bartlett of Boston	1962
Philip Ferry Whitmore of Sunderland	1962
William Michael Cashin of Milton	1963
Grace A. Buxton of Worcester	1963
Ernest Hoftyzer of Wellesley	1964
Alden Chase Brett of Belmont	1964
Victoria Schuck of South Hadley	1965

Members Ex Officio

His Excellency Foster Furcolo, *Governor of the Commonwealth*

Jean Paul Mather, *President of the University*

Owen B. Kiernan, *Commissioner of Education*

Charles Henry McNamara, *Commissioner of Agriculture*

Officers of the Board

His Excellency Foster Furcolo, *Governor of the Commonwealth, President*

Joseph Warren Bartlett of Boston, *Chairman*

John Gillespie of Amherst, *Secretary*

Kenneth William Johnson of Amherst, *Treasurer*

The Graduate School Staff

J. Paul Mather, *President of the University*

Shannon McCune, *Provost*

Gilbert L. Woodside, *Dean of the Graduate School*

Deans of the Schools

Heads of Departments in which Graduate Courses are offered

Members of the University Faculty who are in charge of courses offered for graduate credit. The entire staff is listed in the General Catalog of the University.

The Graduate School Council

Gilbert L. Woodside, *Dean of the Graduate School, Chairman*

Fred V. Cahill, Jr., *Dean of the College of Arts and Sciences*

William B. Esselen, *Head of the Department of Food Technology*

Marshall C. Howard, *Associate Professor of Economics*

Fred P. Jeffrey, *Associate Dean of the College of Agriculture and Director of the Stockbridge School of Agriculture*

H. B. Kirshen, *Dean of the School of Business Administration*

G. Stanley Koehler, *Associate Professor of English*

Henry N. Little, *Professor of Chemistry*

Warren Litsky, *Professor of Bacteriology*

George A. Marston, *Dean of the School of Engineering*

Shannon McCune, *Provost*

Helen S. Mitchell, *Dean of the School of Home Economics*

Claude C. Neet, *Head of the Department of Psychology*

Albert W. Purvis, *Dean of the School of Education*

Dale H. Sieling, *Dean and Director of the College of Agriculture*

H. T. U. Smith, *Head of the Department of Geology and Mineralogy*

John D. Trimmer, *Head of the Department of Physics*

GENERAL INFORMATION

HISTORY

Graduate courses leading to advanced degrees have been offered at the University of Massachusetts since 1876. In the early years the graduate work was conducted under the direct administration of the President in conjunction with the undergraduate program. The demand for advanced work increased, however, and in June, 1908, the Board of Trustees made the Graduate School a separate unit in the University.

LOCATION

The University of Massachusetts is located in Amherst, a town of about ten thousand people. It is eighty-eight miles from Boston, fifty miles from Worcester, twenty-five miles from Springfield, eighteen miles from Greenfield and eight miles from Northampton. The campus consists of a tract of approximately seven hundred acres, and is well provided with modern buildings and equipment, description of which may be found in the General Catalog of the University.

PURPOSE AND SCOPE

The purpose of the Graduate School is to provide qualified students with proper guidance in the methods of advanced study and research. It is dedicated to the ideal of the advancement of knowledge, and seeks to impart to each student respect for true scholarship.

Courses are available leading to the degree of Doctor of Philosophy, Master of Arts, Master of Arts in Teaching, Master of Education, Master of Business Administration, Master of Landscape Architecture, Master of Science, Master of Science in Agricultural Engineering, Master of Science in Chemical Engineering, Master of Science in Civil Engineering, Master of Science in Electrical Engineering, and Master of Science in Mechanical Engineering.

ADMISSION

Requirements for admission:

1. A Bachelor's degree or the equivalent from any college or university of recognized standing.
2. An official transcript of all previous college work.
3. A letter of recommendation from the head of the department or other faculty member of the applicant's undergraduate major.
4. A letter of recommendation from someone (not connected with the applicant's undergraduate major) who is qualified to judge the student's ability in academic work.
5. The applicant must have been in the upper half of his graduating class. If the transcript does not indicate the rank of the applicant, it is the duty of the Committee on Admissions to evaluate the transcript.
6. Acceptance by the department and by the Admissions Committee of the Graduate School Council.

Admission to the Graduate School does not imply admission to candidacy for an advanced degree. Such candidacy is subject to specific requirements as laid down by the several departments, and the student must secure the approval of the Head of the Department in which he desires to major before he can become a candidate for a degree in that subject.

Graduates of Normal Schools are permitted to take courses in the 200 series in the School of Education, but not as candidates for a University of Massachusetts degree.

GENERAL INFORMATION

With the approval of the Head of the Department concerned and the Dean of the Graduate School, special students are permitted to take graduate courses. Special students may not register for thesis credits. If special students do graduate work of high quality they may apply for admission to regular standing in the Graduate School.

ESTIMATE OF EXPENSES

A charge of $50 per semester, payable in advance, which covers tuition, laboratory and student health fees, is imposed on students who are residents of Massachusetts. For residents of other states or foreign countries, this charge is $150 per semester. In cases where students carry less than a full schedule of courses, a special tuition rate is provided. Residents of the State pay $5 per credit; non-residents pay $15. For purposes of definition, all students claiming residence in the State shall at time of admission provide the treasurer's office with an official statement from their town or city clerk as evidence.

Candidates for a Master's degree who have paid a full year's tuition in the Graduate School are not required to pay an additional amount if they later register for a Master's thesis.

Candidates for the Doctor of Philosophy degree who have paid two full years' tuition in the Graduate School are not required to pay an additional amount if they later register for the Doctor's thesis.

Board should not be in excess of $14 per week. Rooms for graduate students are not available in the dormitories, but can be rented in private homes at from $30 to $35 per month. The cost of books and incidentals should not exceed $150 per year.

TEACHING FELLOWSHIPS

The University offers a number of teaching fellowships for the purpose of assisting with the instructional program of various departments. The stipend varies, up to a maximum of $2200 for the academic year, depending upon the qualifications of the applicant. Fellows are not required to pay tuition or fees. Teaching Fellows may carry up to thirteen credits per semester, but the total for both semesters of any one academic year may not exceed twenty-four credits. Application should be made to the Dean of the Graduate School.

DEPARTMENTAL FELLOWSHIPS

These fellowships are awarded on a competitive basis to graduate students who are doing their major work in any department in the Graduate School. The stipend varies, up to a maximum of $2200 for the academic year, depending upon the qualifications of the applicant. Fellows are not required to pay tuition or fees. At the discretion of the department, they may be assigned to either teaching or research duties, or they may do part-time teaching and part-time research. With the approval of the Department, the research may be that which is required for an advanced degree or it may be part of a departmental research program. Departmental fellows may carry up to thirteen credits per semester, but the total for both semesters of any one academic year may not exceed twenty-four credits. Application for appointment to one of these fellowships should be made to the Dean of the Graduate School.

RESEARCH FELLOWSHIPS

A number of research fellowships are available to qualified graduate students. These are made possible because funds are provided by (a) various industries, (b) the Experiment Station, or (c) research grants awarded to members of the Graduate School Faculty either from sources outside the University or from a fund provided by the University and administered by the Research Council. Stipends vary with the type of work and the amount of time involved. Inter-

ested students should make application to the Head of the Department in which they plan to work.

LOTTA CRABTREE FELLOWSHIPS

A limited number of fellowships paying $2000 each are available to students in the broad field of agriculture. Students applying for these fellowships must be interested in earning the Doctor of Philosophy degree for the purpose of serving agricultural pursuits. Application should be made to the Dean of the Graduate School.

THE CRAMPTON RESEARCH FUND

Interest from the Guy Chester Crampton Research Fund is used to help defray the costs of publication of worthy research papers completed by students or occasionally by staff members. Information concerning the fields of work for which grants may be made, and instructions for application, may be obtained from Department Heads, the chairman of the Crampton Fund Committee or the Graduate School office.

REQUIREMENTS FOR DEGREES

All of the requirements for the several advanced degrees listed below (Ph.D. and all Master's degrees) must be completed by the applicable date

May 28
September 1
February 1

if the degree is to be received at the Commencement following the particular date.

Doctor of Philosophy

In order to provide proper direction for the Ph.D. candidate, a Guidance Committee of three will be appointed, or if necessary reappointed, for each student as soon as possible after his first registration as a candidate for the doctorate, and not later than two months after his first registration. This Committee will be appointed by the Scholarship Committee of the Graduate Council from members of the Graduate Faculty, recommended by the Department Head of the student's major department, and will consist of two members of the major department and one other person.

This Guidance Committee shall meet with the candidate as soon as possible after the appointment has been made. At least three weeks prior to the candidate's second registration the Committee shall file in the Graduate Office a summary of the proposed major and minor program of the student, including specific courses recommended by the Committee. In addition to this original meeting with the student, the Guidance Committee's responsibilities shall be to:

a. Plan the entire Graduate School program of the student.
b. Arrange for the preliminary written comprehensive examination of the student.
c. Plan for the satisfying of the language requirement by the student.
d. Supervise the thesis project and arrange for the final examination. The Guidance Committee will serve as the Thesis Committee for the Ph.D. candidate.
e. Report the fulfillment of all requirements to the head of the major department; the vote of the Committee to be unanimous on this.

The degree is conferred upon graduate students who have met the following requirements:

1. The preparation of a dissertation satisfactory to the Guidance Committee and the major department.

2. The earning of at least ninety graduate credits, at least sixty of which must be in the major field, at least fifteen in a minor field or fields related to, but not part of, the major field, and not more than thirty in recognition of the dissertation.

3. The passing of a preliminary written comprehensive examination in the major and minor fields, supplemented by an oral examination at the option of the major department, both examinations to be conducted by the major department, to be passed not later than eight months before the completion of the candidate's work.

The department in which the student has enrolled for courses in the minor field has a choice of submitting questions for the comprehensive examination or the certifying of the student as having satisfied all the requirements of each course, except that the examination is required for all courses where the grade in the course was C.

If the student fails a part of the comprehensive examination he may be permitted to make up the deficiency under the direction of his Guidance Committee. In case of failure of the entire comprehensive examination, a candidate may be permitted a second and final opportunity, but not within twelve months.

4. Satisfying the following language requirements: two languages, foreign to the candidate and not in the same linguistic group, as recommended by the major department. Proficiency tests should be passed as early as possible and *must be passed prior to the preliminary examination.* See page 14.

5. The passing of a final examination, at least partly oral, conducted by the Guidance Committee primarily upon, but not limited to, the contents of the candidate's dissertation. It cannot be scheduled until all members of the Thesis Committee have approved the thesis. The oral examination is to be conducted by the Thesis Committee. The Examining Committee is to consist of the Thesis Committee, the Dean of the Graduate School, the Dean of the School or College in which the department is located, and such members of the major department as the head shall appoint. In order to pass, the candidate must receive the unanimous vote of the Thesis Committee. *Not more than one dissenting* vote shall be allowed for the total Examining Committee present.

6. Satisfying the residence requirement. At least 30 course credits must have been earned at this University. Credits for each graduate course become invalid nine years following the date of completion of the course except that graduate credits previously earned which have been accepted by the Graduate School Council for full credit toward the requirements of the Ph.D. degree shall become invalid nine years from the date of first registration in the Ph.D. program.

7. All fees and expenses must be paid before the degree will be conferred.

MASTER'S DEGREES

Master of Arts, Master of Science, Master of Science in Agricultural Engineering, Master of Science in Chemical Engineering, Master of Science in Civil Engineering, Master of Science in Electrical Engineering, and Master of Science in Mechanical Engineering

The basic requirements for the above degrees are:

1. Thirty graduate credits, of which not more than six may be transferred from other institutions. Twenty-one of the thirty credits must be in the major field. Courses offered for minor credit only cannot be taken for major credit toward an advanced degree by students majoring in the department or non-departmentalized school concerned. If a thesis is offered, six credits must be earned in "200" series courses; if a thesis is not offered, twelve credits must be earned in "200" series courses. Not more than ten credits may be earned by means of a thesis. No credit is valid after six years.

2. The thesis is optional with the school or department, but if there is one, it shall be under the supervision of a committee appointed by the Scholarship Committee of the Graduate School Council. The thesis must be approved by this committee and by the major department. The candidate must pass a general oral examination (not limited to the thesis topic) to be conducted by the Thesis Committee. If there is no thesis, the candidate shall take a general examination, written or oral, or both under the supervision of the head of his major department. If a student offers a thesis, problem courses shall be limited to three credits; if a thesis is not offered, the limit shall be six credits.

3. All foreign language requirements are optional with the school or department.

4. All fees and expenses must be paid before the degree will be conferred.

Master of Education

The degree is conferred upon graduate students who have met the following requirements:

1. Thirty graduate credits of which no more than six may be transferred from other institutions. Fifteen of the thirty credits must be in Education, and of these twelve credits must be earned in "200" series courses. No credit is valid after six years.
2. Either the Problem or Field Study is required and the student must pass a comprehensive oral examination. Credits in problem courses are limited to six.
3. All fees and expenses must be paid before the degree will be conferred.

Master of Arts in Teaching

This is a cooperative program between the College of Arts and Sciences and the School of Education intended primarily for graduates of approved liberal arts institutions who have had little or no course work in professional education. The student will register in the School of Education for either the secondary or elementary teaching program.

The special provisions are:

1. Secondary school program. Eighteen hours in the fundamental professional courses usually required for certification; at least twelve hours in general education courses of which six hours will be in "200" series courses.

2. Elementary school program. Twenty-four hours in the fundamental professional courses usually required for certification; at least twelve hours in general education courses of which six hours will be in "200" series courses.

Provisions applying to both groups:

1. Ordinarily the program will be undertaken in one year of residence or one year plus a summer session, and for this degree no credit will be valid after two years.

2. All fees and expenses must be paid before the degree will be conferred.

Master of Business Administration

1. Candidates for the degree of Master of Business Administration must satisfactorily complete thirty semester hours of approved graduate work providing such students have completed their undergraduate degree with a major in Business Administration and/or Economics.

2. For those students who have not presented the undergraduate degree in Business Administration and/or Economics the School shall determine what courses will constitute adequate preparation up to a maximum of thirty additional semester hours.

3. The thesis is advisable but optional and students who complete a thesis will receive nine credit hours in lieu of course credit.

4. Each candidate for the Master of Business Administration degree shall be required to pass a written comprehensive examination and an oral examination. The former shall be completed at least two weeks before the candidate is admitted to the oral examination.

5. Applicants for admission may be required to take the Admissions Test for Graduate Study in Business given each year by the Educational Testing Service of Princeton, New Jersey.

6. All expenses and fees must be paid before the degree will be conferred.

Master of Landscape Architecture

The degree is conferred upon graduate students who have met the following requirements:

1. Work covering at least two years, of which a minimum of one and one-half years must be devoted to study in residence, and a minimum of one-half year spent in practice. Specific requirements concerning the nature of such practice are determined by the department.

2. Submission of a written report on the work done in practice, or an oral examination conducted by the department staff.

3. The earning of not less than forty-five credits of which thirty shall conform essentially to the "fifth year program" (see page 89) the remainder to be selected from the "200" series on page 87, with minor deviations at the discretion of the department.

4. Preparation of a satisfactory thesis.

5. The passing of final examinations, written and oral.

6. All fees and expenses must be paid before the degree is conferred.

COURSES OFFERED

Courses available as major subjects for the degree of Doctor of Philosophy:

- Agronomy
- Bacteriology
- Botany
- Chemistry
- Economics
- Entomology
- Food Sciences
- Food Technology
- Plant Pathology
- Poultry Science
- Psychology
- Zoology

Courses available as major subjects for a Master's degree:

- Agricultural Economics
- Agricultural Engineering
- Agronomy
- Bacteriology
- Botany
- Business Administration
- Chemical Engineering
- Chemistry
- Civil Engineering
- Dairy and Animal Science
- Economics
- Education
- Electrical Engineering
- English
- Entomology
- Food Technology
- Forestry
- Geology
- Government
- History
- Home Economics
- Horticulture
- Landscape Architecture
- Mathematics
- Mechanical Engineering
- Philosophy
- Physics
- Plant Pathology
- Poultry Science
- Psychology
- Public Health
- Romance Languages
- Sociology
- Wildlife Management
- Zoology

Courses available as minor subjects:

- Agricultural Economics and Farm Management
- Agricultural Engineering
- Agronomy
- Art
- Bacteriology
- Botany
- Business Administration
- Chemical Engineering
- Chemistry
- Civil Engineering
- Dairy and Animal Science
- Economics
- Education
- Electrical Engineering
- English
- Entomology
- Food Technology
- Forestry
- Geology
- German
- Government
- History
- Home Economics
- Horticulture
- Landscape Architecture
- Mathematics
- Mechanical Engineering
- Philosophy
- Physical Education for Men
- Physics
- Plant Pathology
- Poultry Science
- Psychology
- Public Health
- Romance Languages
- Sociology
- Veterinary Science
- Wildlife Management
- Zoology

GENERAL STATEMENT

Graduate credit will be allowed for grades of A, B, and C. Not more than six credits of C will be allowed for a Master's degree. Not more than twelve credits of C will be allowed for the Doctor of Philosophy degree. Thesis work must receive a grade of A or B to be accepted by the Graduate School. No graduate credit will be given for courses numbered below 100.

Course numbering system at the University of Massachusetts:

1-99 for undergraduate students. No graduate credit if elected by graduate students.
100-149 for graduate students only.
150-199 for both graduate and undergraduate students.
200-299 for graduate students only.

After registration is completed, courses may be added or dropped or changed from credit to audit only upon the approval of the student's adviser and the Dean of the Graduate School. The consent of the instructor also is necessary for the addition of courses. If the student is not passing a course at the time it is dropped, a failure will be recorded. No student, under any conditions, may drop a course after these dates: first semester, November 1; second semester, March 20, Summer School, two weeks from the beginning of the summer session, without a failure unless granted permission by the Scholarship Committee of the Graduate School Council.

A student can obtain credit for an "incomplete" only by finishing the work of the course before the end of the next semester (whether or not he is enrolled). The initiative in arranging for the removal of an "incomplete" rests with the student. This regulation does not pertain to problem or thesis credits.

Students in the Graduate School may be dismissed for failure to abide by the rules of the University.

The University reserves the right to make changes in the requirements for degrees without notice.

GRADUATE READING EXAMINATION IN FOREIGN LANGUAGES

1. A Graduate Reading Examination will be given by the German and Romance Language Departments upon written request from the head of the Department in which the student in question is doing his graduate work. The request should be sent to the head of the language department concerned, via the Dean of the Graduate School, *at least ten days before the examination is to be administered.*

2. The examination will be given three times during the academic year. The dates are:

1958-59	August (at the end of the summer session)
	December 5 or 6
	April 24 or 25
1959-60	August (at the end of the summer session)
	December 4 or 5
	April 29 or 30
1960-61	August (at the end of the summer session)
	December 2 or 3

3. Prior to the administration of the reading examination the student may, if he and the representative of the language department agree, have a brief, informal interview so that it can be determined whether he has reached the point at which he is likely to deal competently with Ph.D. reading material in the foreign language.

4. The examination will be a written test of the student's ability to translate with mature comprehension from the foreign language into English. The use of a dictionary will be permitted.

5. The examination will consist of passages taken from books and/or journals pertaining to the major field in which the graduate student is working.
6. A committee of three members of the language department concerned will grade the examination.
7. The Graduate Office, the head of the department requesting the examination, and the graduate student concerned will be notified within ten days of the examination whether the student has passed or failed.
8. In case of failure, a study period of at least four months will be required before a re-examination may be given, unless otherwise agreed upon. In the case of repeated failure, the candidate will not be admitted to the examination for the fourth time unless the language department concerned is satisfied that he has made adequate progress.

THESES

A thesis must be on a topic in the field of the candidate's major subject, and must indicate that its writer possesses the ability and imagination necessary to do independent constructive thinking. The following rules should be adhered to in the preparation and presentation of a thesis:

The objective of a thesis should be an attempt to make a real contribution to knowledge. When completed it should be of a quality worthy of publication as a contribution from the department concerned.

The thesis, in its completed form, will be judged largely upon the ability of the author to review literature and reach definite deductions; to formulate a problem, plan a method of attack, and work out a solution; and to summarize his material and draw conclusions. Scholastic attainment in writing and presenting the results of the study will also be an important factor in the evaluation. No thesis markedly poor in its English will be accepted.

A. Master's Theses:

Four copies of each master's thesis outline are to be transmitted to the Dean of the Graduate School by the Head of the Department in which the student is majoring. The letter of transmittal should contain the name of the professor within the department who is responsible for the direction of the student's research. This professor will be appointed the Chairman of the student's Thesis Committee. Other possible members of the Thesis Committee might be suggested in the letter of transmittal, but the Scholarship Committee of the Graduate School Council has the responsibility of assigning all faculty members to Thesis Committees. If recommended by the head of the major department, two of the three members of the Thesis Committee may be members of the major department.

It is the responsibility of the chairman of the Thesis Committee to arrange a conference with other members of the Thesis Committee and the student for the purpose of discussing the research problem before approving the thesis outline. This should be done as soon as possible after the appointment of the Thesis Committee.

The fourth copy of the student's thesis outline is then to be signed by each member of the Thesis Committee to indicate approval of the outline and to indicate the fact that a conference with the student has been held. The fourth copy of the thesis outline is then to be returned to the Dean of the Graduate School.

The outline for the thesis for the Master's degree must be presented not later than January first of the year in which the student expects to get the degree, or five months before he expects to complete the work for the degree.

B. Master's and Ph.D. Theses:

The Thesis Committee will have direct charge of all matters pertaining to the thesis, and it is recommended that the student use the advice available from this source in the progress of his research. The thesis must have the unanimous approval of this committee and of the major department before arrangements are made for the final examination for the degree.

GENERAL INFORMATION

Three complete bound copies of the thesis, including drawings and any other accessories, are required by the Graduate School in order that the files in the Graduate Office, the library, and the department in which the thesis was prepared may be supplied. The original copy will be deposited in the library by the Graduate School. The student is responsible for the binding of the thesis.

If the thesis is printed, whether in periodical or book form, the fact that it is a thesis submitted for an advanced degree at the University of Massachusetts shall be explicitly stated in the title itself or as a footnote on the front page.

Because of the time required to give adequate consideration to the research conducted by the student, it is highly desirable that theses be submitted to the committee, in the case of doctor's theses, not later than March 15, and in the case of master's theses, not later than May 15 of the academic year in which the degrees are to be conferred. The theses in their final bound form shall be deposited with the Dean of the Graduate School by May 28. (September 1 for students planning to receive their degrees in the fall; February 1 for students planning to receive their degrees in the winter.)

If typewritten, whether designed for publication or to remain in the typewritten form, the size of the sheet, the arrangement of the title page, the general structure of the thesis, the character of the paper, and the binding must conform to definite standards.

A. *Size of sheet.* Size of sheet must measure 8½ x 11 inches.

B. *Form of title page.* The title page should be distributed as artistically as possible and must be arranged in this order:
   a. Subject.
   b. Name of author.
   c. Degrees previously earned and names of institutions awarding them.
   d. "Thesis submitted in partial fulfillment of the requirements for the degree of —."
   e. "University of Massachusetts, Amherst."
   f. Date.

C. Following the title page, the arrangement may take such form, variable of course with the subject matter, as is illustrated below:
   a. An analytical outline of the thesis.
   b. An introductory statement in which the purposes of the author are set forth.
   c. The body of the thesis composed of literature critically reviewed and deductions made, formulation of method of attack or procedure, and results secured. (All literature reviews and any work done by others should be so separated that no question can be raised as to which portion of the thesis represents the original investigation. It should be clearly kept in mind that *compilation* is not considered original investigation.)
   d. Summary and conclusions.
   e. Bibliography. (This should have the approval of the Chairman of the Thesis committee before final arrangement.)
   f. Acknowledgments.
   g. Statements of approval signed by members of the thesis committee.

D. *Paper.* See sample in the University store.

E. *Binding.* See sample of binding in the Graduate School Office.

All theses are the property of the University.

GRADUATE COURSES DURING THE SUMMER

The University offers opportunities to pursue graduate courses during the summer in connection with the Summer School. Details regarding courses offered, facilities for study, etc., may be found in the Summer School Catalog, a copy of which is available upon request to the Provost of the University.

DESCRIPTION OF COURSES

AGRICULTURAL ECONOMICS

ADRIAN H. LINDSEY, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Research.—Investigations of problems in Agricultural Economics and Farm Management. Credit, 3.
THE STAFF.

202. Agricultural Price Theory.—The application of economic principles and measurements to the analysis of agricultural prices. Credit, 3.
MR. WESTCOTT.

203. Advanced Food Marketing.—Interrelationships of markets and prices, marketing margins, efficiency techniques, demand and supply analyses.
Credit, 3.
MR. FITZPATRICK.
Prerequisite, Agricultural Economics 155 or permission of instructor.

205. Research Methods in Production Economics.—Procedures and techniques applied in economic analysis of the farm firm including budgeting (comparative statics), linear programming and other quantitative processes.
Credit, 3.
MR. CROSSMON.
Prerequisite, Agricultural Economics 175 or permission of instructor.

300. Thesis, Master's Degree. Credit, 4-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

155. Marketing.—Problems, types of marketing agencies, principal marketing functions, marketing costs and margins, price quotations and exchange operations, governmental regulations and the consideration of improvement proposals. Credit, 3.
MR. LINDSEY.

156. Fundamentals of Cooperation.—The development of cooperative organizations and the economic analysis of cooperative principles and operation.
Credit, 3.
MR. LINDSEY.

157. Agricultural Credit and Land Appraisal.—The principles and methods of land valuation and credit extension. There is also a study of the operations of institutions granting credit to agriculture. Credit, 3.
MR. LINDSEY.

171. Agricultural Economic Theory.—A comparative and critical study of the significant contributions of the leading economists from Adam Smith to the present. Credit, 3.
MR. FOSTER.

AGRICULTURAL ECONOMICS

175. **Farm Organization and Management.**—A study of the special problems facing particular farm businesses and the application of economic principles in their solution. Problems include choice of enterprises, selection of particular productive combinations and farm adjustments to changing prices and technology. Credit, 3.

Mr. Foster.

176. **Advanced Farm Management.**—Selected case farms representative of certain types of farming conditions in Massachusetts will be carefully analyzed. Plans for alternative farm adjustments will be projected using the budgetary method. Credit, 3.

Mr. Crossmon.

Statistics 177. **Elementary Experimental Statistics.**—"Chi" squire, "t" and analysis of variance tests of significance; frequency distribution, average, dispersion, regression and simple correlation description; and chart and table presentation are the specific fields covered. Credit, 3.

Students electing Statistics 177 may not take Statistics 179.

Mr. Russell.

178. **Principles of Land Economics.**—A study of the utilization of agricultural land and the economic problems of development, settlement, conservation and policy. Credit, 3.

Mr. Foster.

Statistics 179. **Elementary Economics Statistics.**—"Surveys, tables, charts, frequency distributions, averages, dispersion, standard error and its use, quality control, index numbers, time series, and simple correlation are the specific fields covered." Credit, 3.

Students electing Statistics 179 may not take Statistics 177. Mr. Russell.

Statistics 180. **Advanced Statistical Method.**—Multiple correlation and analysis of variance. Credit, 3.

Mr. Lindsey and Mr. Russell.

182. **Advanced Farm Operation.**—A study of farm operations with special emphasis on time and motion experiments. Credit, 3.

The Department.

189. **Seminar.**—Public and price policy for agriculture. Credit, 2-3.

Mr. Lindsey.

190. **Seminar.**—Agricultural Institutions. Credit, 2-3.

The Staff.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Two hundred courses listed in the Department of Economics and the School of Business Administration may be taken with the approval of the major adviser.

AGRICULTURAL ENGINEERING

R. W. Kleis, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Special Problems. Credit, 1-6.
The Staff.

240. Advanced Farm Structures.—The application of structural theory in the development of high strength structures. The use of building materials and fastening for attaining diaphragms and prestressed components in the development of the structure.
The use of structural factors in the control of environment. Credit, 3.
Prerequisite, Agricultural Engineering 173. Mr. Clayton.

241. Control of Heat and Vapor Flow in Agricultural Buildings and Processes.—Application of mass flow theory to heat and vapor transfer. Thermal and vapor interchange between environment and livestock controlling production rates of metabolic and respiratory heat. The application of instruments and controls. Credit, 3.
Prerequisite, Agricultural Engineering 173. Mr. Clayton.

250. Unit Operations in Agriculture.—Machine rates and production standards in the production and handling of crops. The uses of climatic data, water control, and production schedules in crop operations. Plant layout and equipment for processing and storage. Energy requirements of alternate methods of processing. Credit, 3.
Prerequisite, Permission of Instructor. Mr. Zahradnik.

260. Agricultural Processing.—Heat, refrigeration, and vacuum in dehydrating, storing, and concentrating agricultural products. Critical temperatures, latent heats, fermentation, respiration, and equilibrium moisture content, as they affect the processes and the end products. The effects of modified atmosphere, adsorbents, and dessicants. The application of instruments and controls.
Prerequisite, Agricultural Engineering 173. Credit, 3.
Mr. Kleis.

276. Advanced Agricultural Machinery Design.—Stress analysis, periodic vibration, and shock leadings, as related to design of agricultural machinery. The mathematical definition of tillage tool surfaces. Dynamics of suspension devices, automatic release equipment, and hydraulic systems. Credit, 3.
Prerequisite, Agricultural Engineering 176. Mr. Kleis.

291. Seminar.—Research Methods in Agricultural Engineering. Credit, 1.
The Staff.

292. Seminar.—Research accomplishments in Agricultural Engineering. Credit, 1.
The Staff.

300. Thesis, Master's Degree. Credit, 4-8.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

171. Farm Power.—The study of internal combustion engines used in farm tractors and power units. Credit, 3.
Prerequisites, Civil Engineering 52 and Mechanical Engineering 65, 68.
Mr. Tague.

173. **Farm Structures.**—A study of the strength and durability of building materials, construction systems and the mechanical principles underlying their use in farm-construction. In the drafting room studies will be made of some major farm building and complete working drawings finished in all essential details. Credit, 4.
Prerequisites, Civil Engineering 34, 51 and 61. Mr. Clayton.

176. **Agricultural Machinery.**—The study of design and operational problems of agricultural field machinery. Credit, 3.
Prerequisites, Civil Engineering 52, Mechanical Engineering 68 and 83.
Mr. Kleis.

178. **Drainage, Reclamation and Conservation.**—The engineering phase of drainage and reclamation. The various systems are studied, complete layouts established in the field, and problems of flow and run-off given. Credit, 3.
Prerequisites, Civil Engineering 27, 75, or 76; Agronomy 2. Mr. Boyd.

185. **Rural Electrification.**—The utilization of electricity in agriculture. Credit, 3.
Prerequisites, Electrical Engineering 61 and 62. Mr. Kleis.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Agricultural Engineering)

151. **House Planning.**—Plan designs of the small house will be made. The arrangement of interior equipment, especially in the kitchen, and lighting, heating, water supply, and sewage disposal will be studied, together with a brief history of the house materials, construction methods, equipment, and architectural styles. The economics of house building, including financing, maintenance and overhead expense. Credit, 3.
Mr. Johnson.

181. **Food Process Engineering.**—A study of food processing machinery and instrumentation. Credit, 3.
Mr. Zahradnik.

182. **Refrigeration.**—Fundamentals in planning and operating a refrigerated storage with particular reference to size, details of construction, cooling load, and refrigerating machinery and accessories. For non-engineering majors.
Prerequisite, Agricultural Engineering 180. Credit, 2.
Mr. Zahradnik.

AGRONOMY

William G. Colby, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Special Problems. Credit, 3 or 6.
The Staff.

211. **Field Crop Production.**—The regional distribution, the cultural requirements, production, and the utilization of the principal field crops grown in the U. S. 1959-60 and each alternate year. Credit, 3.
Mr. Colby.

216. Forage Crops.—The regional distribution, the cultural requirements and the utilization of the principal forage crops grown in the U. S. 1958-59 and each alternate year. Credit, 3.
Mr. Colby.

226. Crop Improvement.—Applied genetics involving a study of various plant breeding procedures used in the improvement of important agricultural crops. Credit, 3.
Prerequisites, Zoology 153, Plant Breeding 152. Mr. ———.

263. Chemistry of the Soil.—The chemistry of soil formation, soil acidity, nutrient element availability, ionic exchange, and fixation, biological soils reactions, soil-plant-microorganism relationships, and of organic matter of the soil will be discussed. The laboratory work will consist of physical, analytical and biochemical investigations of soils and important soil constituents.
Credit, 5.
Mr. Steckel.

264. Experimental Methods in Agronomy.—Some of the concepts of the application of statistics to the analysis and interpretation of data obtained in agricultural research. Such points as choice of field, design of experiments, effect of competition, interpretation of results, and other special factors that need to be considered in well-planned experiments are discussed. Credit, 3.
Mr. Yegian.

290. Seminar. Credit, 1 each semester.
The Staff.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. Field Crops.—The uses and improvement of the field crops of the U. S. with their soil and climatic requirements. Emphasis will be given to the best farm practices of the northeastern states as to rotation, liming, seeding methods, tillage, disease and insect control, and methods of harvesting and storage. As an individual problem, each student must make a detailed plan of crop production for the actual conditions of some New England farm.
Credit, 3.
Mr. Colby.

152. Forage Crops.—Analysis of the basic principles involved in the establishment, fertilization, and management of forage grasses and legumes.
Three class hours. Credit, 3.
Prerequisite, Agronomy 2 or equivalent. Mr. Colby.

153. Agrostology.—All factors that influence the successful growing of fine turf grasses are studied and correlated to enable the student to have a practical working knowledge of the construction and maintenance of lawns, sports fields, highways, airport and cemetery turf. Credit, 3.
1958-59 and each alternate year. Mr. Roberts.

156. Agrostology.—Fine turf management as a business and profession. Emphasis is placed on diagnosis and treatment of turf failures; the selection of equipment and supplies and client approach. Field trips and practical exercises arranged. Credit, 3.
1958-59 and each alternate year. Mr. Roberts.

157. **Soil Formation.**—Physical, chemical, biological, climatic and geological factors involved in soil formation. The relationship of these factors to the kinds of soils formed in the United States. Credit, 3.
Mr. Southwick.

158. **Soil Utilization.**—The relationship of climate and native vegetation to the broader aspects of soil formation; man's use of land resources; soil use and abuse; soil erosion control and its significance to permanent agriculture. Credit, 3.
Mr. Southwick.

178. **Fertilizers and Soil Fertility.**—The relation of soils and fertilizers to plant growth; fertilizer practices in the United States and Europe; the history of fertilizer development, with special emphasis upon early discoveries and causes of failure in early research; factors which relate fertilizers and soils to plant growth. Fertilizer formulation technology and practice are considered in detail in the laboratory. Credit, 3.
Prerequisite, Agronomy 2 or equivalent. Mr. Zak.

179. **Soil Physics.**—For seniors in Agronomy. The factors in soil which control tilth and energy relationships and the laws of physics which govern these factors. Included are heat, light, color, particle size and charge, water and gas movement, energy relationships and other physical factors effecting changes in the soil. Credit, 3.
Mr. ———.

184. **Soil Chemistry.**—For plant science and soil science students. Fundamental inorganic, organic, and biochemical reactions of soils. Plant nutrition and microbiological plant interrelationships. In the laboratory, methods and techniques used in soil chemistry research and in plant science investigations. Methods of determining exchangeable bases, base exchange capacity, soil phosphate fractionation, and many other determinations peculiar to soil investigations. Credit, 5.
Prerequisites, Chemistry 29, 30, Botany 168, Agronomy 157. Mr. Steckel.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Bacteriology 151, 152. Advanced Bacteriology. Credit, 3 each semester.
Miss Garvey.

Botany 202, 203. Advanced Plant Physiology. Credit, 2-4 each semester.
Mr. Gentile.

Botany 159, 160. The Angiosperms. Credit, 3-5 each semester.
Mr. Davis and Mr. Schuster.

Botany 166. General Mycology. Credit, 3.
Mr. Bigelow.

Botany 167, 168. Introductory Plant Physiology. Credit, 3 each semester.
Mr. Gentile.

Botany 181. Plant Ecology. Credit, 3.
Mr. Livingston.

Botany 182. Plant Geography. Credit, 3.
Mr. Livingston.

Botany 189. Plant Cytogenetics. Credit, 3.
Mr. ———.

Chemistry 208. Chemical Spectroscopy. Credit, 3.
Mr. Stidham.

Chemistry 237. Biocolloids. Credit, 3.
Mr. Bennett.

Civil Engineering 280. Applied Soil Mechanics. Credit, 3.
Mr. Hendrickson.

Geology 201. Optical Mineralogy. Credit, 3.
Mr. Nelson.

Geology 156. Lithology. Credit, 3.
Mr. Nelson.

Geology 189. Geomorphology. Credit, 3.
Mr. Smith.

Home Economics 203. Advanced Nutrition—Metabolism of the Major Foodstuffs. Credit, 3.
Miss Mitchell.

Home Economics 204. Advanced Nutrition—Vitamins and Minerals. Credit, 3.
Miss Mitchell.

Horticulture 162. Plant Breeding Methods. Credit, 3.
Mr. French.

Horticulture 181. Plant Cytological Techniques. Credit, 2.
Mr. French.

Horticulture 182. Special Problem in Plant Breeding. Credit, 2.
Mr. French.

Plant Pathology 175. Methods in Plant Pathology. Credit, 3.
Mr. Banfield.

Plant Pathology 205, 206. Advanced Plant Pathology. Credit, 2-4 each semester.
Mr. Banfield.

ART

COURSES FOR MINOR CREDIT ONLY

175. Art Appreciation. Credit, 3.
Mr. Norton.

178. History of Art. Credit, 3.
Mr. Norton.

BACTERIOLOGY

RALPH L. FRANCE, major adviser.

Registration by permission of the Department. Prerequisite courses required of graduate students in bacteriology are general chemistry, qualitative and quantitative analysis, organic chemistry, physics, and specified courses in undergraduate bacteriology. Students who have not taken these courses as undergraduates will be required to fulfill these requirements here without graduate credit.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Special Problems.—Research experience for students who do not write a thesis. Credit, 3-6.
THE STAFF.

201. History of Bacteriology.—The development of bacteriology from antiquity to the present time. Credit, 2.
THE STAFF.

202. Advanced Bacterial Physiology.—Lectures, literature reviews, and laboratory exercises in bacterial nutrition, metabolism, and growth.
Prerequisites, Bacteriology 51, 198, and Chemistry 179 or 193. Credit, 3-5.
MR. MANDEL.

203. Bacterial Cytology.—Lectures, literature reviews, and laboratory demonstrations, designed to give the student a comprehensive survey of the structure of bacterial cells and the functions of their components.
Prerequisites, College Biology and Bacteriology 31. Credit, 3-5.
MR. READ.

204. Research Project.—Investigational work on bacteriological problems not related to thesis. Limited to 3 credits per semester. For Ph.D. candidates only. Credit, 1-6.
THE STAFF.

205. Advanced Immunology.—Advanced theories and laboratory procedures basic to bacteriology, immunology, and serology.
Prerequisite, Bacteriology 185. Credit, 3-6.
MISS GARVEY.

206. Microbiological Fermentations.—Theories, methods, and processes by which various chemicals and biological materials are produced industrially through the action of microorganisms. The laboratory experiments consider the microorganisms involved, procedures used, and the chemistry of the fermentation reactions.
Prerequisites, Bacteriology 51 and Chemistry 179 or 193. Credit, 3.
MR. CZARNECKI.

207. Virology.—A comprehensive study of viruses, including laboratory work covering methods for cultivation and identification.
Prerequisite, permission of instructor. Credit, 3.
MR. GOLDMAN.

208. Seminar.—Reports on current literature and special topics. One credit each semester. Credit, 1-6.
THE STAFF.

213. Antibiotics.—The historical background and theory of action of antibiotics are correlated with practical laboratory procedures used in the study of their isolation, methods of assay, and effects on morphology and survival of bacteria.
Prerequisites, Bacteriology 51 and 52. Credit, 3.
Mr. Czarnecki.

214. Microbial Genetics.—Inheritance and variation in microbes, and mechanisms of recombination, transformation, and transduction.
Prerequisites, Bacteriology 203 and Zoology 153. Credit, 3.
Mr. Mandel.

215. Antiseptics and Disinfectants.—A critical evaluation of antiseptics and disinfectants, and the procedures used in testing them. Studies of various classes of antiseptics and disinfectants correlate chemical structure to antibacterial activity, mode of action, speed of action, and specificity.
Prerequisites, Bacteriology 51 and Chemistry 151. Credit, 3.
Mr. Litsky.

300. Thesis.—Master's Degree. Credit, 10.

400. Thesis.—Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

181. General Applied Bacteriology.—Routine and special tests used in present-day applied bacteriology. Methods for determining the sanitary quality of milk and milk products, water, shellfish, eating and drinking utensils, and air.
Prerequisite, Bacteriology 31, or permission of instructor. Credit, 3.
Mr. France.

185. Immunology.—The consideration of host reactions which favor the prevention and cure of infectious diseases; qualitative and quantitative estimations of toxins and antitoxins; the use of biological products such as antigens and immune sera in differential bacteriology and the diagnosis of infectious diseases; a consideration of isohemagglutinins as determinants of blood groups.
Prerequisites, Bacteriology 51 and permission of instructor. Credit, 3.
Miss Garvey.

195. Studies of Special Microbial Groups.—The biology of autotrophic bacteria, photosynthetic bacteria, actinomycetes, myxobacteria, chlamydobacteria, spirochaetes, and pleuro-pneumonia-like organisms.
Prerequisite, Bacteriology 51. Credit, 3.
Mr. Mandel.

198. Bacterial Physiology.—The kinetics of population growth, enzymatic constitution, growth requirements, metabolic pathways, and effects of radiation.
Prerequisites, Bacteriology 31, Chemistry 179, and permission of instructor.
Credit, 3.
Mr. Mandel.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Bacteriology)

151, 152. Advanced Bacteriology.—Bacterial metabolism and the influence of environmental factors on growth and viability. The differentiation and identification of bacterial species by morphological, cultural, physiological, and

serological studies. A comprehensive picture of the various forms of existing bacteria, and techniques for the isolation, cultivation, and identification of both pathogenic and non-pathogenic species.
Prerequisite, permission of instructor. Credit, 3 each semester.
Miss Garvey.

182. **Quantitative and Qualitative Bacteriology.**—Bacteriological principles which apply to the preservation, fermentation, and spoilage of foods; the sanitary examination of foods; the causes of food poisoning; microbiological assays.
Prerequisite, Bacteriology 51, or permission of instructor. Credit, 3.
Miss Garvey.

190. **Sanitary Bacteriology.**—Public health laboratory methods. Practical application of methods through field studies.
Prerequisite, permission of instructor. Credit, 3.
Mr. France.

192. **Clinical Microbiology.**—Routine clinical laboratory procedures.
Prerequisite, permission of instructor. Credit, 3.
Mr. France.

BOTANY

Robert B. Livingston, major adviser.

A thesis will be required of certain candidates for the M.S. in Botany.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. **Special Problems.**—Selected research problems in botany not related to the candidate's thesis. Credit, 1-5 each semester.

A. Plant Cytology and Genetics. Mr. Davis.

B. Plant Ecology. Mr. Livingston.

C. Plant Mycology. Mr. and Mrs. Bigelow.

D. Plant Morphology. Mr. Davis and Mr. Putala.

E. Plant Physiology. Mr. Gentile.

F. Plant Taxonomy. Mr. Schuster, Mr. Davis and Mr. Livingston.

202, 203. **Advanced Plant Physiology.**—Selected topics in plant physiology. Lectures, laboratory, and individual conferences. Credit, 2-4 each semester.
Prerequisites, Botany 167 and 168 and one semester of Organic Chemistry.
Mr. Gentile.

207. **Advanced Plant Ecology.**—Lectures, conferences, critical reading and reports on advanced considerations of synecology and autecology. Credit, 3.
Mr. Livingston.

300. **Thesis, Master's Degree.** Credit, 1[illegible]

400. **Thesis, Ph.D. Degree.** Credit, 3[illegible]

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

159, 160. The Angiosperms.—A study of the angiosperm orders from the standpoint of reproductive morphology, ecology, evolution, economics and history. Credit, 3-5, each semester.
1958-59 and each alternate year.
Mr. Davis and Mr. Schuster.

161, 162. Comparative Anatomy of Green Plants.—The anatomy, evolution, and taxonomy of chlorophyllus plants, including extinct as well as living forms.
1959-60 and each alternate year. Credit, 3 each semester.
Prerequisite, one semester of cryptogamic botany.
Mr. Schuster.

163, 164. Comparative Morphology of Fungi.—Comparative morphology, life history and habitat of representative species of important orders and families. Credit, 3 each semester.
Mr. Bigelow.

166. General Mycology.—The study of fungi; life history and morphology of representative species, their distribution in nature, their significance in plant and animal disease and their utilization in industrial fermentations.
Credit, 3.
Mr. Bigelow.

167, 168. Introductory Plant Physiology.—A study of the processes occurring in plants and their relation to the complex of activities constituting plant growth. Credit, 3 each semester.
Mr. Gentile.

181. Plant Ecology.—The relationships of plants to environment including a study of environmental factors (autecology) and of plant communities (synecology). Credit, 3.
Mr. Livingston.

182. Plant Geography.—Lectures and assigned readings of descriptive and historical plant geography as well as basic principles governing the natural distribution of plants. Credit, 3.
Mr. Livingston.

189. Plant Cytogenetics.—The interpretation of hereditary phenomena in individuals and in populations, in terms of cell structures. A correlation of plant cytology and genetics which includes embryology, hybridization, polyploidy, apomixis, evolutionary trends and distribution patterns. Credit, 3.
Mr. ———.

COURSE FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Botany)

157. Microtechnique.—The preparation of microscopic mounts including the use of biological stains with the infiltration, celloidin and paraffin methods, and the use of slide and rotary microtomes. Credit, 3.
Mr. Putala.

BUSINESS ADMINISTRATION

H. B. KIRSHEN, major adviser.

The program of graduate courses in Business Administration is designed to prepare for positions of responsibility in business, in organizations that serve business, in government, and in related fields of teaching.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Independent Study and Research.—Independent study and research on selected problems in Business Administration. Permission of the instructor and the dean required. Credit, 3 each semester.
THE STAFF.

201. The Business Enterprise.—The legal-economic-political environment in which business enterprise operates; the risks of enterprise and profits; market demand analysis; cost-price combinations and production policies; the effects of business fluctuations on the individual enterprise; the enterprise system and public policy as expressed in legislation. Credit, 3.
MR. SMART.

211. Accounting in Management.—The theory of accounts applied to management problems; the established methods of accounting in operating situations; the use of quantitative data as bases for policy decisions. Credit, 3.
MR. SINGER.

222. Marketing Management.—The function of marketing from the point of view of the business executive; the broad aspects of product planning and choice of channels of distribution; distribution problems; the interrelations between research planning, execution and control of marketing activity. Credit, 3.
MR. HARDY.

230. Financial Management.—Financing current operations: financial analysis and planning; credit management; and the sources and management of working capital. Long-term financial policies: the uses of corporate securities; the capital structure; surplus and dividend policies; financing new enterprises; the recapitalization and reorganization of going concerns. Credit, 3.
MR. LUDTKE.

241. Organizing for Production.—Situations which confront executives in charge of manufacturing operations and the direction of people at work. Designed to develop skill in analyzing production processes to determine specific adaptations of production and personnel techniques to the requirements of differing processes. Credit, 3.
MR. HACKAMACK.

252. Administrative practices.—Assuming a knowledge of business processes, this course considers the problems of human relations in business and industry and that phase of administration concerned with policy formation. Credit, 3.
MR. O'DONNELL.

271. Seminar in Business Administration I.—A critical and intensive study of selected problems in the field of business. Credit, 3.
MR. KIRSHEN.

272. Seminar in Business Administration II.—A continuation of 271. Credit, 3.
MR. KIRSHEN.

300. Thesis, Master's Degree. Credit, 9.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

Accounting

161. Intermediate Accounting.—An application of accounting principles to problems of income determination and the classification and valuation of assets. Credit, 3.
Mr. Fitzgerald.

162. Advanced Accounting.—A continuation of Accounting 161, concerned with the valuation of assets and liabilities, accounting for net worth, statements of application of funds and the analysis of financial statements. Credit, 3.
Mr. Fitzgerald.

164. Advanced Cost Accounting.—A continuation of the theory and practice of cost accounting with emphasis on standard, estimated, and distribution costs. Credit, 3.
Mr. Lentilhon.

173. Federal Income Tax Procedures.—Federal income tax laws and regulations as they affect individuals; the preparation of tax returns; a study of federal security taxes. Credit, 3.
Mr. Anderson.

177. Auditing.—The verification of accounting records dealing with audit theory and procedure. Credit, 3.

178. Advanced Federal Tax Procedures.—Advanced phases of Federal taxation with particular attention to inventories, depreciation, and accounting methods. Study and preparation of returns for partnerships, corporations, estates and trusts; Federal estate and Federal gift taxes. Credit, 3.
Prerequisite, Accounting 173. Mr. Anderson.

Finance

176. Life Insurance.—The application of life insurance to the problems of family security, business security, investments and estate protection. Credit, 3.
Mr. Kyler.

183. Investments.—The principles and techniques that are useful for the analysis and selection of investment media; investment policies of individuals and institutions. Credit, 3.
Mr. Ludtke.

General Business

166. Traffic Management.—The relationships and responsibilities among carriers, regulatory authorities and users of transportation services. Credit, 3.
Mr. Rivers.

172. Business Law II.—The legal aspects of business organization and some laws of public regulation. Credit, 3.
Prerequisite, Business Law 70. Mr. Smart.

Management

167. Management and Union Relations.—A comparison of union-management objectives, functions and structures including the scope and impact of union penetration into areas of management authority. The union-management decision process in the areas of finance, administration and dispute settlement. Credit, 3.
Mr. Conlon.

196. Problems of General Management.—An intensive analysis through study of actual cases of the problems that confront managers in the manufacturing division of a business. Credit, 3.

Mr. O'Donnell.

Marketing

180. Problems in Marketing.—Problems of market management, especially the interrelation between research planning and the execution of sales programs. Effects of various marketing policies upon individual firms and the industry. Prerequisite, Marketing 53. Credit, 3.

Mr. Drew-Bear.

CHEMICAL ENGINEERING

Ernest Lindsey, major adviser.

The graduate course in Chemical Engineering is designed to emphasize advanced study in engineering fundamentals rather than specific technological applications.

To be admitted to full graduate study in this field either of the following requirements should be met:

1. Applicant must have a Bachelor's Degree in Chemical Engineering from a recognized school or,
2. Applicant must show satisfactory academic training or demonstrate proficiency in these subjects as a minimum:

Mathematics: Through Calculus.
Chemistry: Organic, Analytical, Physical.
Engineering Mechanics: Statics, Strength of Materials.
Chemical Engineering: Stoichiometry, Unit Operations, Thermodynamics (including thermodynamics of chemical change).
Electrical Engineering: Elements of circuits and machines.

Required Courses

1. Ch. E. 300, Thesis, maximum 10 credits.
2. At least four of the following five courses:
   Ch. E. 201, 202, Thermodynamics.
   M.E. 221, Heat Transfer.
   Ch. E. 231, 232, Mass Transfer.
3. Additional courses selected from the following to complete the required 30 credits:
   Ch. E. 182, 195; E.E. 201, 202; Math. 156, 183, 192, 193, 194; Statistics 177; Chemistry 177, 181, 186, 203, 205, 206, 214, 237; C.E. 275; Bacteriology 181; M.E. 183, 190; Physics 185, 186.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

201. Chemical Engineering Thermodynamics I.—A review of the fundamental laws of thermodynamics, P-V-T relations of fluids, thermodynamic functions, fluid flow, compression and expansion of gases, liquefaction and separation of gases. Credit, 3.

Prerequisite, Chemical Engineering 181 or equivalent.

Mr. Lindsey and Mr. Duus.

202. Chemical Engineering Thermodynamics II.—Phase equilibria and chemical reaction equilibria and their applications in chemical processing. Prerequisites, Chemistry 166 and Chemical Engineering 181. Credit, 3.

Mr. Lindsey and Mr. Duus.

231. Mass Transfer I.—Theories of diffusion leading to unified treatment of mass-transfer unit operations: molecular and eddy diffusion, mass-, heat-, and momentum transfer analogies, two film theory, diffusion in turbulent flow and related topics. The last third of the course deals with applications of these principles to general gas-liquid operations. Credit, 3.
Prerequisite, Chemical Engineering 156.

Mr. Cashin.

232. Mass Transfer II.—A continuation of course 231. Application of principles to design factors in distillation, gas absorption, adsorption and ion exchange and liquid-liquid extraction. Other unit operations may be substituted for the above depending on the interests of the class. Credit, 3.
Prerequisite, Chemical Engineering 231.

Mr. Cashin.

300. Thesis, Master's Degree.—A theoretical or experimental study of some chemical engineering problem. Credit will be determined by the work done, and by agreement with the Department and the Graduate Thesis Committee.
Credit, 8-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

182. Industrial Equilibria and Kinetics.—Phase and chemical equilibria and rates of reaction in chemical processes from the industrial point of view.
Prerequisites, Chemistry 166 and Chemical Engineering 181. Credit, 3.

Mr. Duus.

183. Survey of Nuclear Engineering.—An introduction to the principles of nuclear physics and a survey of problems involved in the design and operation of nuclear reactors. Heat transfer, shielding, metallurgy, controls, waste disposal and health physics.
Prerequisites, two semesters of chemistry and mathematics through integral calculus. Credit, 3.

Mr. Marcus.

195. Process Equipment Design.—The design of process equipment for the chemical industries: riveted pressure vessels, welded pressure vessels, piping, attachments and closures, etc. Credit, 2.
Prerequisites, Chemical Engineering 155 and Civil Engineering 153.

Mr. Lindsey.

198. Advanced Heat Transfer.—Heat transfer in the unsteady state and by radiation between solids and radiation from gases. Typical problems will be worked in all of the above employing mathematical, graphical, and analog field plotter (electrical analogy) methods. Credit, 2.
Prerequisite, Chemical Engineering 156.

Mr. Cashin.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Chemical Engineering)

155. Unit Operations I.—The fundamental principles underlying the unit operations of fluid flow, heat transfer, and evaporation; the thermodynamic properties of matter.
Three class hours; two 3-hour computation periods. Credit, 5.
Prerequisites, Mathematics 30 or 31 and Chemistry 30.

Mr. Cashin.

156. **Unit Operations II.**—A continuation of course 155 concerning distillation, gas absorption, liquid-liquid extraction, filtration and, if time permits, size reduction and separation.
Three class hours; two 3-hour computation periods. Credit, 5.
Prerequisite, Chemical Engineering 155.

Mr. Cashin.

158. **Organic Chemical Technology.**—Some unit processes involved in the manufacture of organic chemicals; e.g. nitration, amination, halogenation, oxidation. Credit, 3.

Mr. Duus.

177. **Elements of Unit Operations.**—An introduction to some of the unit operations of process industries, with emphasis on principles and types of equipment, rather than on quantitative aspects and design. Credit, 3.
Prerequisites, Chemistry 30, Physics 25 and 26.

Mr. Duus and Mr. Lindsey.

181. **Heat-Energy Relations.**—Energy relations in chemical processes, types of energy, energy balances, second law, thermodynamic functions, including: P-V-T relations of fluids, compression and expansion processes.
Three class hours. Credit, 3.
Prerequisite, Chemistry 166.

Mr. Duus.

188. **Chemical Engineering Laboratory.**—A quantitative study of pilot plant size equipment illustrating some unit operations with special emphasis on the securing of accurate data, correct operating technique, and report writing. Field trips when possible. Credit, 3.
Prerequisite, Chemical Engineering 156.

The Staff.

CHEMISTRY

Walter S. Ritchie, major adviser.

The Department of Chemistry provides facilities for students intending to complete the requirements for the Master's degree and the Doctor's degree. Students accepted for graduate study are expected to have met the usual requirements for the Bachelor's degree. Those who have not fulfilled these requirements may be admitted as special students until the deficiencies have been removed.

First year graduate students will take placement examinations during the first week of residence. These examinations are for the purpose of evaluating the background of the student, and to assist in the selection of a course of study. Students are admitted to candidacy for a degree only after the satisfactory passing of written qualifying examinations, at which time thesis problems are selected in one of the following fields of chemistry: physical, organic, inorganic, analytical, and biochemical.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

201. **Inorganic Preparations.**—Laboratory.—The preparation and testing of various types of inorganic substances, to teach important techniques and give familiarity with the reactions and properties of inorganic materials. Credit, 3-5.

Mr. Smith and Mr. Zajicek.

202. **Inorganic Chemistry of the Less Familiar Elements.**—Lectures and collateral reading on the descriptive chemistry of some of the less familiar elements such as boron, gallium, indium, thallium, the lanthanides, fluorine, titanium, vanadium, tantalum, tungsten, and uranium, with correlations between structure or spatial configurations and chemical properties. Credit, 3.
1959-60 and each alternate year.

Mr. Roberts.

203. **Physical Chemical Measurements.**—Laboratory.—Experiments selected from standard texts and from the literature in Physical Chemistry to meet the needs and background of the individual student. Credit, 3-5.
Prerequisites, Chemistry 165 and 166 or equivalent.

The Staff.

205. **Chemical Thermodynamics.**—The first and second laws of thermodynamics; the concept of the Boltzmann distribution and the partition function; the calculation of thermodynamic function from these quantities; the calculation of equilibrium constants from both thermochemical and spectroscopic data; the application to electrochemistry and ionic equilibria. Credit, 3.
1958-59 and each alternate year.
Prerequisites, Chemistry 165 and 166.

Mr. Stein and Mr. Ragle.

206. **Gases, Kinetics, and Catalysis.**—Basic concepts of the kinetic theory of gases and the absorption of gases by solids; kinetics of homogeneous gas reactions and chain reactions. The theory of absolute reaction rates; homogeneous and heterogeneous catalysis, photochemical, radiation induced reactions, and reactions in solution. Credit, 3.
1958-59 and each alternate year.
Prerequisite, Chemistry 205 or its equivalent.

Mr. Stein.

208. **Chemical Spectroscopy.**—Theory, technique and applications of infrared and Raman spectrometry. Credit, 3.
1959-60 and each alternate year.
Prerequisites, Chemistry 165 and166 or equivalent.

Mr. Stidham.

211, 212. **Quantum Chemistry.**—Quantum mechanics and its application to chemical problems. A discussion of the exact theory of structure of simple atoms, the application of approximate methods for complex atoms and molecules, the chemical bond, resonance, the interaction of radiation and matter, group theory.
1959-60 and each alternate year. Credit, 3 each semester.
Prerequisite, Chemistry 186 or equivalent.

Mr. Stein and Mr. Ragle.

214. **Physical Chemistry of High Polymers.**—Structure of solid polymers, determination of molecular weights, sizes and shapes, mechanical properties of solid polymers, colligative properties of polymer solutions, polyelectrolytes, and physical chemistry of proteins. Credit, 3.
1959-60 and each alternate year.
Prerequisite, Chemistry 205 or equivalent.

Mr. Stein.

215. **Topics in Physical Chemistry.** Credit, 2.
Prerequisite, Chemistry 177, 186 or equivalent.

The Staff.

221. **Advanced Analytical Chemistry.**—Laboratory consisting of special work to meet the needs of the individual student. Credit, 3-5.
Prerequisite, Chemistry 183 or equivalent. Mr. Roberts.

223. Introduction to Micro-Chemistry.—Laboratory.—The applications of micro technique to synthesis, analysis, and characterization; the microscopic work may include the optics of the microscope, micrometry, the microscopic study of fibers, crystals, and physiochemical phenomena and an introduction to microscopical qualitative analysis; the quantitative work may include the determination of carbon, hydrogen, nitrogen, and halogens in organic materials and selected inorganic determinations. Credit, 3-5.
Prerequisite, Chemistry 183 or equivalent.

Mr. Roberts.

227. Heterocyclic Chemistry.—The chemistry of the common organic heterocyclic compounds containing nitrogen, oxygen, and sulfur. Consideration of mechanisms of the reactions discussed.
Three class hours. Credit, 3.
Prerequisite, Chemistry 181 or equivalent.

Mr. Cannon.

229, 230. Theoretical Organic Chemistry.—Lectures on special topics such as stereochemistry, bond formation, resonance, ionic reactions, free radical reactions, transition state theory, reaction mechanisms, molecular rearrangements, etc. Credit, 3 each semester.

1958-59 and each alternate year.
Prerequisite, Chemistry 181 or its equivalent.
Chemistry 181 may be taken simultaneously with Chemistry 229.

Mr. Cannon.

231. Advanced Organic Chemistry.—Laboratory.—More difficult synthesis of organic compounds, frequently those desired as starting materials for research, will be assigned to the individual student. Their preparation will require the use of the original literature. Credit, 3-5.
Prerequisite, a year course in Organic Chemistry.

Mr. Cannon, Mr. Ritchie,
Mr. Carpino and Mr. McWhorter.

232. Organic Chemistry.—An intensive survey of certain reactions of organic chemistry with emphasis on their scope and limitations, recent developments, and mechanisms.
1959-60 and each alternate year. Credit, 3.
Prerequisite, Chemistry 181.

Mr. Cannon.

234. Advanced Biochemical Lectures.—Recent developments in the chemistry and intermediary metabolism of proteins, lipids, carbohydrates, nucleic acids and other materials of biological significance. Credit, 3.

Mr. Little.

235. Biochemistry Laboratory Methods.—Advanced individual laboratory work on preparation, examination and analytical techniques for proteins, carbohydrates, lipids, enzymes; methods of colloid chemistry will be included.
Credit, 3-5.

Mr. Little.

236. Advanced Biochemical Analysis.—Advanced laboratory in analytical methods applicable to naturally occurring materials including foods, feeds, etc.; research methods and techniques as well as routine methods. Credit, 3-5.

Mr. Little.

237. Biocolloids.—The fundamental principles of colloidal behavior and some applications to industry, agriculture, and biology. Credit, 3.
Prerequisite, Chemistry 152 or equivalent.

Mr. Bennett.

239. Chemistry of Natural Products.—Natural products of current interest, primarily from the steroid, terpene, and alkaloid groups, with emphasis on structural proofs, stereochemistry, synthesis, and biogenetic relationships.

Credit, 2.

Mr. McWhorter.

251. Seminar.—Conferences, reports or lectures.

Credit, 1 each semester.
Maximum credit, 2.

Mr. Ritchie.

295. Research Problem.—The student will prepare a proposal for a research problem not directly related to his thesis topic if the latter has been selected. The problem will involve primarily library research. A committee of three department members will approve the student's topic not later than four weeks from the start of the semester and conduct an oral examination before the end of the semester in which the topic was approved. A written report must be submitted and approved by the committee one week before the examination. Required of all candidates for the Ph.D. in Chemistry and must be completed before the candidate's preliminary examination for the degree. Credit, 5.

The Staff.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

177. Advanced Physical Chemistry.—Introductory quantum and statistical mechanics, thermodynamics of non-ideal systems, and theories of gases, liquids, solids, and solutions.
Three class hours. Credit, 3.
Prerequisites, Chemistry 165 and 166.

Mr. Stein and Mr. Stidham.

181. Organic Chemistry.—An intensive survey of the important reactions of organic chemistry with emphasis on their scope and limitations, mechanisms, and recent developments.
Three class hours. Credit, 3.

Mr. Cannon.

182. Qualitative Organic Chemistry.—The characterization of organic compounds by means of physical properties, class reactions, and the preparation of suitable derivatives.
Two class hours; two 3-hour laboratory periods. Credit, 4.

Mr. Cannon.

183. Advanced Quantitative Analysis.—The laboratory work will include representative determinations in electrolytic and electrometric methods, and an introduction to colorimetry and other optical methods of analysis.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, Chemistry 30.

Mr. Roberts.

CHEMISTRY

186. **Theoretical Inorganic Chemistry.**—Atomic structure, nuclear chemistry, periodic classification and relationships, valence concepts, acid-base theory, and the chemistry of coodination compounds. Discussed and illustrated with descriptive chemistry of the elements.

Three class hours. Credit, 3.

Prerequisites, Chemistry 165 and 166.

Mr. Smith.

188. **History of Chemistry.**—An historical and biographical study of chemistry and chemists.

Three class hours. Credit, 3.

Mr. Ritchie.

192. **Introduction Research.**—Admission only by permission of the department.

Ten hours of laboratory per week, minimum. Credit, 5.

The Staff.

193, 194. **General Biochemistry.**—A broad introduction to the field of biochemistry for students majoring in chemistry or in the biological sciences.

Three class hours; one 3-hour laboratory period. Credit, 4 each semester.

Prerequisites, Chemistry 151 and 152 or equivalent.

Mr. Little.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Chemistry)

151, 152. **Organic Chemistry.**—The theory of organic chemistry. For students who will specialize in chemistry, as well as those who may specialize in other fields.

Three class hours; one 3-hour laboratory period. Credit, 4.

Mr. Ritchie and Mr. McWhorter.

163. **Chemistry of Water, Sewage, and Sewage Sludge.**—The preparation of reagents and standard methods for the analysis of water, sewage, and sewage sludge.

Two 3-hour laboratory periods. Credit, 3.

Prerequisite, Chemistry 30.

Mr. ———.

165, 166. **Physical Chemistry.**—The fundamental theories and laws of physical chemistry.

Three class hours; one 3-hour laboratory period. Credit, 4 each semester.

Mr. Smith and Mr. Ragle.

179. **Biochemistry.**—An introduction to general biochemistry and physiological chemistry, with particular emphasis on the extension of fundamental organic chemistry to materials and processes of biological significance; proteins, lipids, carbohydrates, enzymes.

Three class hours; one 3-hour laboratory period. Credit, 4.

Prerequisite, Organic Chemistry.

Mr. Little.

CIVIL ENGINEERING

MERIT P. WHITE, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Special Problems. Credit, 3-6.
THE STAFF.

252. Structural Dynamics.—The behavior of simple and complex oscillating systems especially structures subjected to periodic forces to non-periodic forces and to shock loads. Behavior beyond the elastic range is included. Credit, 3.
Prerequisites, Civil Engineering 52 and 53.
MR. WHITE.

261. Materials Testing Techniques.—The machines and auxiliary equipment used in experimental stress analysis for purposes of research. Credit, 3.
Prerequisite, Civil Engineering 53.
MR. PECK.

270. Advanced Structural Theory.—Advanced problems in structural analysis: complex rigid frames; influence lines for indeterminate structures; the placing of loads and the determination of stresses in continuous building frames; prestressed concrete. Credit, 3.
Prerequisite, Civil Engineering 172.
MR. OSGOOD.

271. Arch Analysis.—Analysis of two-hinged and hingeless arches. A design project is included. Credit, 3.
Prerequisites, Civil Engineering 70 and 71.
MR. OSGOOD.

275. Advanced Fluid Mechanics.—Hydraulic similitude, dimensional analysis, methods of obtaining dynamic similarity in hydraulic models in actual practice, analysis of typical hydraulic models. Credit, 3.
Prerequisite, Civil Engineering 75.
MR. HIGGINS.

277. Advanced Sanitary Engineering.—Hydraulic and chemical problems encountered in the design and operation of water and sewage works; stream sanitation and the latest trends of practice and research in the sanitary engineering field. Credit, 3.
Prerequisites, Civil Engineering 77 and 78.
MR. FENG.

279. Theoretical Soil Mechanics.—The phenomena in soil masses subjected to such forces as seepage, frost, and imposed loads. Credit, 3.
MR. HENDRICKSON.

280. Applied Soil Mechanics.—The solution of case problems applying the principles of soil mechanics to the design of embankments, retaining walls, footings, raft foundations, and pile structures. Credit, 3.
Prerequisite, Civil Engineering 279.
MR. HENDRICKSON.

300. Thesis, Master's Degree. Credit, 6.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

172. Advanced Structural Theory I.—Methods of analyzing statically indeterminate structures. Credit, 3.

Prerequisite, Civil Engineering 70.

Mr. Osgood.

182. Soil Testing.—Sampling and testing of soils for engineering purposes. One class hour; two 3-hour laboratory periods. Credit, 3.

Prerequisite, Civil Engineering 80 or equivalent.

Mr. Hendrickson.

188. Advanced Stress Analysis.—Determination of stresses and strains in elements of machines and structures. Credit, 3.

Prerequisite, Civil Engineering 53.

Mr. White.

196. Hydraulic Engineering.—The analysis and design of hydraulic structures such as storage reservoirs, spillways, dams, levees, shore protection and channel works.

Two class hours; one 3-hour laboratory period. Credit, 3.

Prerequisite, Civil Engineering 75.

Mr. Marston.

198. Advanced Transportation Engineering.—Analysis of the engineering aspects of traffic problems such as traffic signal design, street capacities, parking and channelization.

Two class hours; one 3-hour laboratory period. Credit, 3.

Prerequisite, Civil Engineering 55.

Mr. Boyer.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Civil Engineering)

179. Principles of Sanitary Engineering.—For students in the Department of Public Health. Covers phases of Civil Engineering 77 and 78 in the light of the non-engineering background of the student. Credit, 3.

Mr. Feng.

180. Soil Mechanics.—An elementary course in the engineering uses and properties of soils, including seepage, embankment stability, and consolidation.

Two class hours; one 3-hour laboratory period. Credit, 3.

Prerequisite, Geology 50.

Mr. Hendrickson.

DAIRY AND ANIMAL SCIENCE

Animal Husbandry

D. J. Hankinson, major adviser.

Animal Husbandry is a major program of study within the Department of Dairy and Animal Science.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

Major credit for Animal Husbandry students assumes prerequisites in the animal husbandry field as covered in undergraduate courses in this University. All hours by arrangement.

200. Special Problems.—A specific problem in some aspect of animal science. Credit, 3-6.
The Staff.

205. Advanced Animal Nutrition.—The chemistry of feedstuffs and the chemistry and physiology of digestion, absorption and utilization of energy, proteins, minerals and vitamins in milk, meat, wool or work production. Prerequisite, Animal Husbandry 151 or equivalent. Credit, 3.
Mr. Archibald and Mr. Elliot.

211. Advanced Animal Genetics.—The statistical approach to animal breeding, including the development of selection indexes for various farm mammals, sire indexes and breeding plans based on systems of breeding and selection. Prerequisites, Animal Husbandry 166 or equivalent, and Statistics 177 and 180 or equivalent.
Credit, 3.
Mr. Gaunt.

216. Fertility and Fecundity.—The role of heredity, nutrition, pathology and enviroment in the determination of fertility and fecundity in mammalian forms, emphasizing current research directed toward control of reproductive function through experimental means. Credit, 3. Prerequisites, Animal Husbandry 165 or equivalent, and Zoology 187.
Mr. Black.

220. Milk Secretion.—The physiology of milk secretion in relation to the endocrine glands which control it and to more practical aspects of dairy production. The development of the mammary gland from birth through parturition and lactation. Credit, 3.
Mr. Foley.

226. The Histology of Domestic Animals.—The tissues and organs of domestic animals with special emphasis on these features which have particular economic or physiological significance in the fields of livestock production, meats, nutrition, milk secretion and animal breeding. The microscopic structure of the skin and its modifications, fat, muscle, bone, endocrine glands, digestive system and genital systems of farm animals is stressed and related to function. Credit, 3. Prerequisites, Zoology 150 and Veterinary Science 175 or equivalent.
Mr. Greenstein.

229, 230. Seminar.—Reports on current literature. Credit, 1 each semester.
The Staff.

300. Thesis, Master's Degree. Credit, 5-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

165. Reproduction in Farm Animals.—Comparative aspects of anatomy, embryology, endocrinology and physiology of the reproductive systems of farm mammals, concepts of fertility and sterility, and practice in semen collection, artificial insemination and pregnancy diagnosis. Credit, 3.
Mr. Black.

166. Applied Animal Genetics.—The workings of heredity and variation in farm mammals and the role of selection procedures and breeding systems in genetic improvement of livestock. Credit, 3.
Prerequisite, Zoology 153. Mr. Gaunt.

174. Advanced Meats.—Specific aspects of the meat industry will be studied in detail. Credit, 2.
Prerequisites, Animal Husbandry 33 or 154 and permission of instructor.
Mr. Buck.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT MAY BE GIVEN

Bacteriology 185. Immunology. Credit, 3.
Miss Garvey.

Chemistry 234. Advanced Biochemical Lectures. Credit, 3.
Mr. Little.

Chemistry 235. Advanced Biochemical Methods. Credit, 3-5.
Mr. Little.

Chemistry 236. Advanced Biochemical Analysis. Credit, 3-5.
Mr. Little.

Chemistry 237. Biocolloids. Credit, 3.
Mr. Bennett.

Zoology 172. Vertebrate Embryology. Credit, 4.
Mr. Woodside, Mr. Rauch and Mr. Bartlett.

Zoology 183. General and Cellular Physiology. Credit, 4.
Mr. Swenson.

Zoology 187. Endocrinology. Credit, 3.
Mr. Snedecor.

Zoology 245. Advanced Vertebrate Physiology. Credit, 3.
Mr. Snedecor.

Zoology 248. Physiological Genetics. Credit, 3.
Mr. Rauch.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Dairy and Animal Science)

151. Fundamentals of Animal Nutrition.—The nature of nutrients and their metabolism, with nutritive requirements for maintenance, growth, reproduction, lactation and other body functions, emphasizing, ruimants and swine.
Prerequisite, Chemistry 33. Credit, 3.
Mr. Elliot.

152. **Feeds and Feeding.**—The nature and value of the more important feedstuffs. Application of principles in balancing rations for the various classes of livestock. Credit, 2.
Prerequisite, Animal Husbandry 151.
Mr. Elliot.

154. **Meat Processing.**—Discussions of the meat packing industry, classes and grades of meat, and the preparation, preservation and care of meat products. Practical work will emphasize retail cutting and manufacture of meat products. Credit, 2.
Mr. Buck.

156. **Beef and Sheep Production.**—Development, present status and probable future trends in U. S. production of beef and sheep with emphasis on New England; types of production, systems of feeding, breeding, management and marketing. Credit, 3.
Mr. Baker.

177, 178. **Dairy Cattle Production.**—An intensive course covering all phases of dairy cattle and milk production, providing an opportunity to seek the solution to the economic, nutritional, genetic and managerial problems concerned in successful dairying. Credit, 3 each semester.
Mr. Foley.

179. **Horse and Swine Production.**—Light horses are emphasized in the first half of the semester with feeding, breeding, training and some equitation covered. The swine husbandry portion analyzes methods of production, with emphasis on New England, and correlates management practices. Credit, 3.
Mr. Baker.

Dairy Technology

D. J. Hankinson, major adviser.

Dairy Technology is a major program of study within the Department of Dairy and Animal Science.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

Major credit Dairy Technology students assumes prerequisites in the dairy technology field as covered in undergraduate courses in this University.

200. **Problems in Dairy Technology.**—Individual study of specific current problems involved in the processing of dairy products. Credit, 3.
The Staff.

202. **Advanced Dairy Chemistry.**—The physical, colloidal, and chemical properties of dairy products; the role of milk fat, salts, proteins, carbohydrates, and enzyme systems, and their relation to dairy research.
Prerequisite, 175 or equivalent.
Two 1-hour lectures; one 3-hour laboratory period. Credit, 3.
Mr. Potter.

209, 210. **Seminar.**—Reports on current literature. Credit, 1 each semester.
The Staff.

300. **Thesis, Master's Degree.** Credit, 10.
The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

175. Dairy Chemistry.—Physical and chemical principles which explain the behavior of milk and milk products in the various technological operations. Constituents of milk in relation to other organic compounds; physiochemical aspects of certain dairy phenomena such as foaming, coagulation, etc. The laboratory work will include many of the tests used commercially as well as in dairy research, emphasizing the principles and application of both qualitative and quantitative analysis as well as the technique of operating scientific apparatus. Prerequisite, permission of instructor. Credit, 3.
Mr. Potter.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

No more than two courses may be selected from the following list of courses:

Bacteriology 202. Bacterial Physiology. Credit, 3-5.
Mr. Mandel.

Bacteriology 203. Bacterial Cytology. Credit, 3-5.
Mr. Read.

Chemistry 193, 194. General Biochemistry. Credit, 4 each semester.
Mr. Little.

Chemistry 237. Biocolloids. Credit, 3.
Mr. Bennett.

Food Technology 209. Thermal Processing of Foods. Credit, 2.
Mr. Esselen.

Food Technology 210. Thermal Processing of Foods. Credit, 3.
Mr. Esselen.

Food Technology 221. Edible Fats and Oils. Credit, 2.
The Staff.

Food Technology 241. Food Acceptance.—Theory and Methodology. Credit, 3.
Mr. Fagerson.

Home Economics 203. Advanced Nutrition.—Metabolism of major foodstuffs. Credit, 3.
Miss Mitchell.

Home Economics 204. Advanced Nutrition.—Vitamins and minerals. Credit, 3.
Mrs. Wertz.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Dairy & Animal Science)

152. Market Milk.—The various phases of the market milk industry; sanitary production, transportation, pasteurization, and handling in the city plant; marketing, delivery systems, milk and its relation to public health, inspection, milk laws, food value and advertising. Cultured milk and other milk drinks are also included. Some milk plants are visited. Credit, 4.
Mr. Evans.

177. Dairy By-Products.—Half of the semester is devoted to cultured dairy products and cheese; the remainder to butter, condensed and powdered milk. Manufacturing principles in the production of these products. Laboratory work includes the actual production and testing of these products. Credit, 4.
Prerequisite, Dairy 25 or permission of instructor.

Mr. Evans and Mr. Potter.

178. Ice Cream Making.—The principles and practices of ice cream making. Composition, quality, pasteurization, homogenization, aging, and freezing on the finished product. Sherbets, ices, fancy and individual forms, and all flavors of ice cream. Refrigeration machinery, delivery equipment, and merchandising methods. Credit, 4.
Prerequisite, Dairy 25 or permission of instructor.

Mr. Potter.

ECONOMICS

Philip L. Gamble, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Studies in Economics. Credit, 2-5 each semester.

The Staff.

213. Central Banking.—The organization and policies of the major central banks with special reference to the Federal Reserve System. Given as required. Credit, 3.

Mr. Gamble.

227. Mathematical Economics and Economic Model-Building.—The various modern applications of mathematics to economic analysis. Special attention is paid to the analysis of interactions among several variables. Both static and dynamic processes will be examined. Given as required. Credit, 3.
Admission by consent of instructor.
Prerequisites, Economics 173 and Mathematics 29 or the equivalent.

Mr. Schoeffler.

260. Monopoly and Public Utility Problems.—The problem of social control of monopolies and industries affected with a public interest. Given as required. Credit, 3.

Prerequisite, Economics 170.

Mr. Howard.

262. Collective Bargaining.—The legal background of collective bargaining, the process subject matter and problems involved with individual case problems. Credit, 3.

Prerequisite, Economics 179.

Mr. Morris.

272. Advanced Economic Theory.—The various theories of value and distribution. Credit, 3.
Prerequisite, Economics 173.

The Staff.

276. Taxation.—The assessment and administration of taxes with particular attention to the economic and social effects of individual taxes and tax systems. Credit, 3.

Prerequisite, Economics 25, 78 or 178.

Mr. Gamble.

293, 295, 297. Courses in Aggregative Economics.—(These courses rotate but not in a consistent cycle.)

293. Economic Planning.—Various economic plans in effect or proposed throughout the world. Appraisal of the technique of economic planning.
Credit, 3.
Mr. Morris.

294. Institutional Economics.—The major institutions affecting economic problems. Given as required. Credit, 3.
Mr. Howard.

295. Full Employment.—Methods of attaining and maintaining full employment in economy. Credit, 3.
Mr. Gamble.

297. Economic Fluctuations.—Causes, and methods of control of economic fluctuations. Credit, 3.
Mr. Howard.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

Added work required of graduates: (a) extra readings on same or additional assignments, (b) term paper, (c) special problem or project.

154. Money and Monetary Policy.—The relationship between money, national and personal income and monetary policy. Examination of the relationships between individuals, banks, money markets and central banks.
Credit, 3.
Prerequisite, Economics 53 or permission of instructor.
Mr. Gamble.

155. Economics of Consumption.—Patterns of consumption, standards of living and the sources and expenditure of individual and family incomes.
(a and b or c) Credit, 3.
Mr. Morris.

156. Business Fluctuations and Forecasting.—Business fluctuations and current business cycle theories. Credit, 3.
Mr. Howard.

170. Structure of American Industry.—Enterprise, market competition, and economic development in American industries. Credit, 3.
(a, b)
Mr. Howard.

174. Current Economic Problems.—An advanced course; students will be encouraged to pursue lines of individual interest. Credit, 3.
(a, b)
Mr. Grubbs.

177. Economics of International Trade.—The policies, principles, and practices of international trade.
1958-59 and each alternate year. Credit, 3.
(a, b)
Mr. D'Antonio.

178. Public Finance.—The principles underlying public expenditures, public borrowing and taxation. Credit, 3.
(a, b)

Mr. Gamble.

180. Labor Legislation.—The development of American legislation with respect to labor and labor organizations as seen in its historical and social context, and in its current application. Credit, 3.
(a, b)

Mr. Campbell.

183. Social Control of Business.—Methods of social control of economic activity including both formal and informal controls. The efforts to maintain supplement, and moderate competition, and the substitution of regulation or public enterprise for competition. Credit, 3.
(a, b)

Mr. Howard.

184. Comparative Economic Systems.—The various forms of economic organization that have been tried and proposed with an analysis of the economic institutions of representative current economics. Credit, 3.
(a, b)

Mr. Schoeffler.

186. Doctrinal Background of Contemporary Theory.—The modern beginnings of contemporary economic analysis; the foundations laid by classical theory from Physicocracy through Mill; the emergence of neoclassicism and its chief nineteenth century variants, i.e., the Lausanne, the Austrian and the English; certain of the leading dissenters from the main currents, notably Marx, the German historical school, and Veblen. Credit, 3.

Mr. Martin.

191, 192. Seminar. Credit, 1-3.

The Staff.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agricultural Economics 200. Research. Credit, 3.
The Staff.

Agricultural Economics 156. Fundamentals of Cooperation. Credit, 3.
Mr. Lindsey.

Agricultural Economics 171. Agricultural Economic Theory. Credit, 3.
Mr. Lindsey.

Agricultural Economics 178. Principles of Land Economics. Credit, 3.
Mr. Foster.

Agricultural Economics 180. Advanced Statistical Method. Credit, 3.
Mr. Lindsey and Mr. Russell.

Agricultural Economics 189, 190. Seminar. Credit, 2-3.
Mr. Lindsey and Mr. Russell.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Economics)

153. Money, Banking and Credit.—A critical survey of the development and operation of the monetary and banking systems of the United States. Credit, 3.

Mr. Gamble.

173. **Modern Economic Theory.**—Current theories about value, distribution and prices. Credit, 3.
Mr. Schoeffler.

179. **Labor Problems.**—The background and character of the modern labor problems with special reference to the United States. Credit, 3.
(a and b or c)
Mr. Morris.

EDUCATION

Albert W. Purvis, major adviser.

Before being admitted to candidacy for the Master of Education degree[1], the student must have, in addition to minimum Graduate School requirements:

1. Fifteen hours of such fundamental courses as Education 51, 52, 53, 61, 62, 66, 72, 83, 85, etc., listed in the undergraduate catalog.
2. Experience in teaching. Students entering without teaching experience must arrange for practice teaching as soon as possible.
3. If the major is in secondary education, a major (24 hours) and a minor (12 hours) in the subject-matter fields to be taught.
4. If the major is in elementary school teaching, a broad general education including a minor (18 hours) in one general education field.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

110. **Evaluation in Elementary Schools.**—Standardized and teacher made tests, rating scales, report cards, growth charts, readiness measures, and diagnosis of educational deficiency in elementary pupils. (To be taken instead of Education 153 by those training for elementary teaching.) Credit, 2-3.
The Staff.

120. **Construction of Audio-Visual Aids.**—Designed to help teachers and audio-visual specialists to prepare audio-visual materials for use in an educational program. Students will prepare slides, graphics, recordings, still pictures, motion pictures. Credit, 2-3.
Prerequisite, Education 166.
Mr. Wyman.

130. **Elementary School Science.**—Methods and materials of instruction. Credit, 2-3.
The Staff.

131. **Elementary School Social Studies.**—Recent findings in research in terms of their implications for the elementary school social studies program. Credit, 2-3.
Mr. Rogers.

200. **Problem.**—A critical study of some problem in the educational field. Two bound copies of the written report must be provided for the School of Education by the student. Credit, 4.
Prerequisite, Education 291 or its equivalent.
The Staff.

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[1] For a description of the Master of Arts in Teaching see page 11.

201. **Field Studies in Education.**—Practice in the application of educational theory and technique in the public schools in such fields as supervision, administration, audio-visual organization, and guidance. The student will prepare a comprehensive written report of his practice, experience and problems. A student cannot offer both Education 200 and 201 for the Master's degree. Credit, 4. Prerequisite, Education 291 and teaching experience.

The Staff.

208. **The Teacher and School Administration.**—Problems in admission, promotion, personnel, discipline, extra-curricular activities, supervision, tenure, salary schedules, etc. Credit, 2-3.

Mr. Purvis.

209. **Administering Secondary Schools.**—Housing, finance, schedule, the library, guidance, cafeteria, public relations, etc. Credit, 2-3. Prerequisite, teaching experience.

Mr. Oliver.

210. **Administering Extra-Curricular Activities.**—Scheduling, financing, sponsorship, regulation of pupil participation. Credit, 2-3. Prerequisite, teaching experience.

Mr. Oliver.

211. **Community Relations for School Personnel.**—The development of good public relations policies and the techniques of assisting lay people in interpreting school activities, policies, and objectives. Credit, 2-3.

Mr. Oliver.

213. **Administering Elementary Schools.**—The principal's responsibilities, organization of the school office, scheduling, use of school facilities, curriculum organization, staff relationships, and the place of the school in the community. Credit, 2-3.
Prerequisite, teaching experience.

The Staff.

214. **Principles of Supervision.**—Principles and problems of supervision and the exercise of educational leadership in the improvement of instruction in the elementary curriculum and the secondary school content fields. Credit, 2-3.

The Staff.

215. **Seminar or Workshop in Education.**—Study of current problems in curriculum, instruction, and administration for school personnel in service.

Credit, 2-6.

The Staff.

220. **School Laws of Massachusetts.**—A review of the legal relations of school personnel covering experiences in school and community, presented in a series of selected cases. Credit, 3.

Mr. Purvis.

230. **Comparative Education.**—Studies of contemporary educational systems in such countries as England, France, Germany, Russia, and Japan.
Prerequisite, Education 151. Credit, 2-3.

Mr. Eddy and Mr. Zeitlin.

257. **Children's Literature.**—The basic types and foremost works in the literature for children. Attention to different interest and vocabulary levels and to the criteria for selection of lists for individual children. Credit, 2-3.
Prerequisite, Education 161.

Mrs. Trumbull.

258. **Implementing the Elementary School Program.**—Curriculum design and classroom organization, including practices in planning, presenting, and evaluating programs involving integration of skills and activities for the various grade levels. Credit, 2-3.
Prerequisite, Education 160 and teaching experience.

Miss O'Leary.

265. **Techniques in Remedial Reading.**—Methods and materials in diagnosis and remedial instruction. Credit, 2-3.
Prerequisite, Education 161.

Miss O'Leary.

268. **Administration of Audio-Visual Services.**—To prepare audio-visual coordinators, directors and supervisors in the operation of an audio-visual service. Teacher training, selection of materials and equipment, storage, cataloging, distribution, maintenance, and financial support. Credit, 2-3.
Prerequisites, Education 166 and teaching experience.

Mr. Wyman.

284. **The Junior High School.**—The history of the Junior High School movement; the philosophy, aims and functions of a Junior High School, the instructional program, the role of the basic skills, guidance, organization, extra-curricular activities, and current trends. Credit, 2-3.
Prerequisite, Education 164 or 183.

Mr. Anthony.

289. **Cooperative Curriculum Planning.**—Approved methods of curriculum planning, group work, consensus studies, used by cities and towns in curriculum development. Credit, 2-3.
Prerequisite, Education 188 or 160.

Mr. Kornegay.

291. **Educational Research.**—The principles and methods of research with special emphasis upon the technique used in Education. Statistics are studied chiefly from the standpoint of reporting and understanding the results of research. Credit, 2-3.

The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. **History of Education.** Credit, 2-3.
Mr. Eddy and Mr. Zeitlin.

152. **Principles and Methods of Teaching.** Credit, 3.
Mr. Anthony.

153. **Educational Tests and Measurements.** Credit, 2-3.
The Staff.

160. **Elementary School Curriculum.** Credit, 2-3.
Mr. Rogers.

161. **Elementary Reading and Language Arts.** Credit, 2-3.
Miss O'Leary.

162. Elementary Arithmetic. Credit, 2-3.
Mrs. Trumbull.

164. Principles of Elementary Education. Credit, 2-3.
Miss McManamy.

166. Preparation and Use of Audio-Visual Aids. Credit, 2-3.
Mr. Wyman.

172. Vocational Education in Agriculture. By arrangement. Credit, 3.
Mr. Oliver and Mr. Taft.

173. Apprentice Teaching in Agriculture. By arrangement. Credit, 6.
Mr. Oliver and Mr. Taft.

175. Technique of Teaching Vocational Agriculture. By arrangement. Credit, 3.
Mr. Oliver and Mr. Taft.

181. Workshop in the Teaching of Modern Foreign Languages in Elementary Schools.—Designed for present and prospective elementary school teachers and for teachers in a Modern Foreign Language. Minor credit for students who have a major in a Modern Foreign Language. Summer School only. Credit, 3.
The Staff.

183. Principles of Secondary Education. Credit, 2-3.
Mr. Anthony.

188. Secondary School Curriculum. Credit, 2-3.
Mr. Kornegay.

COURSE FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Education)

185. Observation and Practice Teaching. By arrangement. Credit, 6.
The Staff.

ELECTRICAL ENGINEERING

Carl S. Roys, major adviser.

At least 12 credits, including Electrical Engineering 201 and Electrical Engineering 202 and exclusive of thesis, must be obtained in courses open to graduate students only.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

201. Engineering Analysis I.—Analytical procedures beyond undergraduate levels as applied to problems in the various fields of engineering. Credit, 3.
Prerequisite, Degree of B.S. in Engineering.
Mr. Roys and Mr. Langford.

202. Engineering Analysis II.—A continuation of 201. Credit, 3.
Prerequisite, Electrical Engineering 201.
Mr. Roys and Mr. Langford.

204. Feedback Control Systems II.—Quantitative analysis of closed-cycle control systems and their synthesis on the basis of specified performance characteristics. Credit, 3.
Prerequisite, Electrical Engineering 190.
Mr. Bett.

221. **Power and Machinery Laboratory.**—Class and laboratory studies of some of the more advanced topics. The laboratory work will be varied to suit individual needs when taken concurrently with other courses. Credit, 3.
One class hour; six hours of laboratory.
Prerequisite, Electrical Engineering 81. Mr. Edwards.

222. **Power Systems Metering and Relaying.**—Metering and protective relaying on radial lines, loops and other networks, with emphasis upon coordinated protection and circuit interruption. Credit, 3.
Prerequisite, Electrical Engineering 186. The Staff.

223. **Traveling Waves in Power Systems.**—Fundamental theory of traveling waves with applications to lightning and switching surges, reflection and refraction at transition points, insulation levels and coordination, and high voltage and current surge testing standards. Credit, 3.
Prerequisite, Electrical Engineering 183. Mr. Roys.

224. **Power Systems Operation and Stability.**—Unbalanced and transient conditions; effects of ground wires, ground impedance and mutual coupling impedances; interference with communication systems; effects of saturation and pole saliency in synchronous machines; variability of load impedance; and multimachine problems. Credit, 3.
Prerequisite, Electrical Engineering 186. The Staff.

241. **Communications Networks.**—The fundamental principles and applications of network analysis and synthesis, noise and information theory. Credit, 3.
Prerequisite, Electrical Engineering 79 or its equivalent.
The Staff.

243. **Electromagnetic Engineering I.**—Fundamentals of Electromagnetism, including Ampere's and Faraday's Laws, Gauss' Theorem, retarded potential and Hertz' vector, Maxwell's equations and Poynting's vector, with applications to the propagation, reflection and refraction of electromagnetic waves, radio-frequency lines, wave guides, cavity resonators, antennas and ionospheric reflection. Credit, 3.
Prerequisites, Electrical Engineering 201, 202. Mr. Roys.

246. **Electromechanical Systems and Transducers.**—General theory of dynamic systems as applied to lumped mechanical systems, vibrating membranes and plates, electromechanical converters and acoustics. Applications include microphones, loudspeakers, horns, crystals and electromechanical filters.
Prerequisite, Electrical Engineering 183. Credit, 3.
Mr. Roys.

300. **Thesis, Master's Degree.**—Required of all graduate students in Electrical Engineering. Credit, 3-6.
The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

183. **Transient Analysis.**—The transient behavior of electrical, mechanical, and thermal systems; ordinary and partial differential equations of these systems and their solution by the classical, Heaviside Operational and Fourier and Laplace Transform methods, with a correlated study of Functions of a Complex Variable.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 58.
Mr. Roys.

184. Industrial Electronics.—Special characteristics of the electron tubes of industry; the theory, design and operation of commercial types of equipment, including stroboscopes, grid-controlled and polyphase rectifiers, inverters, welding controllers, speed and voltage regulators, high frequency heating circuits, etc.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 55.

Mr. Roys.

185. Electrical Measurements.— Theory and practice of electric and magnetic measurements; accuracy, precision, and limitations of measurements and devices.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, Electrical Engineering 42.

Mr. Laestadius.

186. Power System Networks.—Power transfer diagrams, voltage studies, system stability criteria, short-circuit calculations and protective methods.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 58.

Mr. Edwards.

187. Power Applications and Control.—Application and control of electric machines, including torque relations, typical control systems, theory of relays, combinational and sequential relay systems and counting circuits.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisites, Electrical Engineering 54, 57.

Mr. Edwards.

190. Feedback Control Systems I.—Analysis and design of basic types of error-sensitive control systems and their components, including servo-mechanisms. Analytical and graphical methods for determining steady state and transient performance; applications to typical electrical, mechanical, and hydraulic systems.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 183.

Mr. Bett.

194. Microwave Engineering.—The fundamental principles of communications and electromagnetism and their application to the special problems of the generation, transmission, propagation and reception of microwaves.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 79.

Mr. Roys.

196. Principles of Electrical Design.—The fundamentals of electric, dielectric, magnetic and heat-flow systems as applied to the design, rating and life of coils, transformers, machinery and other electrical equipment.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, Electrical Engineering 54.

Mr. Roys.

198. Pulse Circuits.—Generation, transmission and processing of information by means of pulses, with applications to computers, communication, radar and television.
Three class hours; one 3-hour laboratory period. Credit, 4.
Prerequisite, Electrical Engineering 183.

Mr. Langford.

ENGLISH

MAXWELL H. GOLDBERG, major adviser.

All graduate students should, as soon as they begin their graduate studies, secure from the Department of English detailed information on requirements. Language requirement: the ability to translate, with the aid of a dictionary, two of the following languages: 1. French, 2. German, 3. Latin, 4. Italian or Spanish.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

201. Old English.—Old English grammar with prose translation. This (or 203) required of all English majors. 1959-60 and each alternate year. Credit, 3.

MR. LANE.

203. Middle English.—The language of Chaucer and the mediaeval romances. This (or 201) required of all English majors. 1960-61 and each alternate year. Credit, 3.

MR. HELMING.

251. Shakespeare.—A close study of *Henry IV—Part 1, Twelfth Night, King Lear, and Cymbeline.* Given in various years. Credit, 3.
Prerequisite, English 155.

THE DEPARTMENT.

254. Carlyle.—The life and writings of Thomas Carlyle. Biographic, textual, ideational, and esthetic problems will be explored so as to develop competence in research and criticism. Given in various years. Credit, 3.
Prerequisite, English 165 or its equivalent.

MR. GOLDBERG.

261. Melville.—The life, thought, and art of the most complex and representative figure of the American Renaissance. Although emphasis will be placed upon the pre-Civil War novels, the later poetry will also be examined. Given in various years. Credit, 3.
Prerequisite, English 185 or 186.

MR. KAPLAN.

264. Joyce, Yeats, and Eliot.—The experiments in expressing personal experience that established the Twentieth Century literary myths. Given in various years. Credit, 3.

MR. VARLEY.

300. Thesis, Master's Degree. Credit, 9.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

In these courses English majors are required to supplement the undergraduate assignments with a substantial special study.

150. Chaucer.—A study of Chaucer's development and pre-eminence as a creative artist and an attempt to appreciate his humanism. Credit, 3.
Three class hours.

MR. HELMING.

151. **The Renaissance in England.**—A study of various aspects of the Renaissance as revealed in such writers as Spenser, Bacon, Sir Thomas Browne, Burton, and Hobbes, with special emphasis on Spenser's *Faerie Queene.*
Three class hours. Credit, 3.
Mr. Lane.

153. **Lyrical Poetry of the Renaissance in England.**—A study of lyrical poets such as Sidney, Campion, Jonson, Herrick, Lovelace, Suckling, Carew, Donne, Herbert, Vaughan, Crashaw, Traherne, and Marvell. Emphasis is given to the "Metaphysical" tradition. Given in various years. Credit, 3.
Three class hours.
Mr. Goldberg and Mr. Barron.

154. **Milton.**—The development of the mind and art of Milton as a Renaissance writer with emphasis on *Paradise Lost, Paradise Regained,* and *Samson Agonistes.* Credit, 3.
Three class hours.
Mr. Goldberg, Mr. Helming and Mr. Koehler.

155. **Shakespeare.**—This course is based upon the reading of about twenty-five of Shakespeare's plays, and attempts both to indicate the evolution of the dramatist and to emphasize the various phases of his art. Credit, 3.
Three class hours. Mr. Rand.

157. **English Literature of the Restoration.**—The social problems and literary values of the Restoration period as they appear in prose, verse, and drama with emphasis on the satire of Dryden and on the development of the theatre from the Restoration through Congreve and the Comedy of Manners.
Three class hours. Credit, 3.
Mr. Koehler.

158. **Elizabethan Dramatists.**—English drama from the death of Elizabeth to the closing of the theatres, with special consideration to the plays of Jonson, Beaumont, Fletcher, Webster, Middleton, Massinger, and Shirley.
Three class hours. Credit, 3.
Mr. O'Donnell.

159. **English Literature of the Eighteenth Century.**—The literature of the Augustan Age, with special emphasis on the writing of Swift and Pope.
Three class hours. Credit, 3.
Mr. Barron.

160. **English Literature of the Eighteenth Century.**—A continuation of English 159, but may be elected independently. The literature of the later Eighteenth Century, with special emphasis on the Johnson Circle.
Three class hours. Credit, 3.
Mr. Barron.

161. **Romantic Poetry.**—The Lake Poets (primarily Wordsworth and Coleridge) and their precursors. 1960-61 and each alternate year.
Three class hours. Credit, 3.
Mr. Rand.

162. **Romantic Poetry.**—A continuation of English 161, but may be elected independently. Byron, Shelley, and Keats. 1960-61 and each alternate year.
Three class hours. Credit, 3.
Miss Horrigan.

163. **American Poetry.**—American poetry from colonial times to 1900, with special emphasis upon the work of Freneau, Bryant, Emerson, Longfellow, Whittier, Poe, Whitman, and Emily Dickinson. Credit, 3.
Three class hours. Mr. O'Donnell and Mr. Williams.

165. **English Prose of the Nineteenth Century.**—The chief Romantic prose writers in relation to literary techniques and main currents of epochal thought and feeling. Among the authors treated are Coleridge, Lamb, Hazlitt, DeQuincey, Landor, Carlyle, and Ruskin. Credit, 3.
Three class hours.

Mr. Goldberg.

166. **English Prose of the Nineteenth Century.**—A continuation of English 165, but may be elected independently. The chief Victorian prose writers in relation to literary techniques and main currents of epochal thought and feeling. Among the authors treated are Macaulay, Newman, Arnold, Mill, Huxley, Pater, and Stevenson. Credit, 3.
Three class hours.

Mr. Goldberg.

167. **Modern Continental Drama in Translation.**—Continental European drama from Ibsen to the present day; a survey of the main currents in late nineteenth century and twentieth century European drama.
Three class hours. Credit, 3.

Mrs. Hogan and Mr. Rudin.

168. **Modern Drama.**—The development of English and American drama from the time of Ibsen to the present day. Credit, 3.
Three class hours.

Mr. Rand and Mr. Williams.

169. **Victorian Poetry.**—A study of Tennyson and Browning. 1959-60 and each alternate year. Credit, 3.
Three class hours.

Mr. Rand.

170. **American Biography.**—The development of American biography and autobiography from colonial to modern times; the tensions between native realism and European elegance, panegyric and "objectivity," compilation and romanticism. 1959-60 and each alternate year. Credit, 3.
Three class hours.

Mr. Helming.

171. **Modern European Biography.**—Types of biographical writing: eighteenth century foreshadowing of modern genres, the nineteenth century standard life and times, twentieth century trends, techniques of the novelist and dramatist in biography, approaches to the stream-of-consciousness method. 1959-60 and each alternate year. Credit, 3.
Three class hours

Mr. Helming.

172. **The Bible as Literature.**—A study of the King James version of the Bible, with emphasis upon the Hebrew as discernible in translation, the poetic qualities characteristic of Tudor England, and the varied influence of the Bible upon subsequent English poetry. Credit, 3.
Three class hours.

Mr. Rand.

173. **The Novel From Defoe Through the Victorians.**—The development of the novel; the reading and discussion of eight or nine great English novels of the eighteenth and nineteenth centuries. Credit, 3.
Three class hours.

Mr. Helming and Mr. Allen.

174. Greek Classics in Translation.—Readings and discussion of the epics of Homer, representative dramas of Aeschylus, Sophocles, Euripides, and Aristophanes, the "Socratic" dialogues of Plato, and Thucydides' history of the Peloponnesian War. The famous myths and stories of classical antiquity, and the literary forms and ideas which have contributed most to subsequent literatures. Three class hours. Credit, 3.

Mr. Helming and Mr. Kaplan.

176. Modern Poetry.—This course attempts to trace the spirit of twentieth century poetry from such authors as Hardy, Whitman, and Emily Dickinson to those of the present day. Credit, 3.
Three class hours.

Mr. Rand and Miss Horrigan.

177. The Modern Novel.—An analytical presentation of eleven or twelve novels written between 1890 and 1920, in which the expanding form and the extension of critical themes will be stressed. Credit, 3.
Three class hours. Mr. Varley.

178. The Contemporary Novel.—A continuation of English 177, covering about twelve novels written between 1920 and 1950, with some consideration of social issues reflected in the fiction. Credit, 3.
English majors will not elect both English 177 and 178.
English 178 may be elected independently of English 177.
Three class hours.

Mr. Varley.

179. Literary Criticism.—Major critical attitudes and principles, in relation to practice and philosophic background, with emphasis on important critics and theorists from Plato and Aristotle through those of the eighteenth century. 1959-60 and each alternate year. Credit, 3.
Three class hours.

Mr. Goldberg.

180. Literary Criticism.—A continuation of English 179, but may be elected independently. Important critics and theorists of the nineteenth and twentieth centuries. 1959-60 and each alternate year. Credit, 3.
Three class hours.

Mr. Goldberg.

181. Creative Writing.—Critical and imaginative composition based upon the examples of standard authors and the experience of the student. Description, narrative, verse, and drama, as well as exposition, with chief emphasis on fiction and poetry. Credit, 3.
Three class hours.

The Staff.

Prerequisites, a grade of A or B in English II (U. of M.) or permission of instructor.

182. Creative Writing.—A continuation of English 181, but may be elected independently. Emphasis on nonfiction. Credit, 3.
Three class hours.

The Staff.

Prerequisites, a grade of A or B in English II (U. of M.) or permission of instructor.

185. Major American Writers.—A selected group of the major American writers of the nineteenth and early twentieth centuries, including Emerson, Hawthorne, Longfellow, Lowell, Henry James, Henry Adams, Fitzgerald, and

Hemingway. A careful analysis of the varying literary forms given to such dominant themes as nature and the conflict between the individual and society. Credit, 3.
Mr. O'Donnell.

186. **Major American Writers.**—A selected group of major American writers of the nineteenth and early twentieth centuries, including Cooper, Poe, Melville, Thoreau, Whitman, Mark Twain, Stephen Crane, Sinclair Lewis, and Faulkner. A careful analysis of the varying literary forms given to such dominant themes as nature and the conflict between the individual and society. Credit, 3.
Mr. Kaplan.

187. **Problems in American Literary and Linguistic Studies.**—An exploration of problems connected with the study of American language and literature in the context of American culture and cultural interrelationships. Credit, 1-3.
Given in various years. The Staff.

188. **Problems in Language and Literature.**—Intended for English majors but open to others by permission and in accordance with the nature of the current offering. An exploration of developments in literary and linguistic methodology and theory, and in the study of language and literature. Readings drawn largely from important English writers, but relevant material from other languages and literatures will be used. Credit, 1-3.
Given in various years. The Staff.

195. **The Symbolist Tradition in English Poetry.**—An intensive study of symbolist elements in the poetry of Blake, Coleridge, the Pre-Raphaelites, Hopkins, and Yeats; and a survey of some of the significant criticism dealing with these writers. Credit, 3.
Three class hours. Mr. Clark, Mr. Barron and Mr. Haven.

197. **Linguistics.**—A basic course combining comprehensive treatment of the field with special attention to recent contributions, particularly in structural linguistics, to the study of language and literature. Credit, 3.
Three class hours. Mr. Meyerstein.

COMPARATIVE LITERATURE

191. **Anglo-German Literary Relationships Since 1750.**—An interdepartmental course conducted by professors of English and German. Subjects and problems common to English and German literature since the middle of the eighteenth century, with attention to German-American literary relationships.
Three class hours. Mr. Goldberg, Mr. Ellert and Mr. Heller.

ENTOMOLOGY AND PLANT PATHOLOGY

Entomology

C. P. Alexander and J. H. Lilly, major advisers.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

(Most courses in the department are given on a 3-year cycle, subject to change on student demand.)

201, 202. **Advanced Insect Morphology and Phylogeny.**—Laboratory, lecture, and reading assignments in morphology and phylogeny of all orders of insects, living and fossil. Credit, 3 each semester.
Prerequisites, Entomology 26, 155, 156, 157 or equivalent. Mr. Hanson.

203. **Insect Embryology.**—The embryological development of a generalized type of insect, after which specific insects are considered. Lectures, assigned readings, laboratory work. Credit, 2.
Prerequisite, Entomology 157.

Mr. Shaw.

204. **Insect Histology.**—Types of tissues and organs of insects. Laboratory work, discussion and assigned readings. Credit, 2.
Prerequisites, Entomology 157; Zoology 51.

Mr. Shaw.

207. **Advanced Insect Physiology.**—Discussion and laboratory work dealing with the functions of the organ systems of insects, with emphasis on methods of analysis and study of physiological processes in insects. Credit, 3.
Prerequisite, Entomology 181 or equivalent.

Mr. Sweetman.

210. **Insect Interrelationships.**—A systematic survey of the various ways in which insects live with, make use of, or are utilized by living organisms, including intra-specific relations. An integrated picture of relationships among insects, and between insects and the living world.
Lectures, readings, papers. Credit, 2.
Prerequisites, Entomology 26 and 179.

Miss Smith.

211. **Insect Behavior.**—The honey bee as a type for the study of behavior; interpretations of the reasons for the actions of this insect. Other species may be included for completeness. Credit, 3.
Prerequisites, Entomology 26, 166 or equivalent.

Mr. Shaw.

212. **Geographical Distribution of Animals and Plants.**—The entire field of distribution of life, including a discussion of physical geography, climate, and other materials basic to the subject. Credit, 3.
2 credits 1st semester, 1 credit 2nd semester.
Prerequisites, Botany 1; Zoology 1.

Mr. Alexander.

214. **Advanced Animal Ecology.**—Basic principles of terrestrial, limnological, and marine ecology, with special emphasis on the influence of causal factors, both physical and biotic, that regulate the activities of all organisms.
Prerequisite, Entomology 179 or equivalent. Credit, 3.

Mr. Sweetman.

221. **Advanced Chemical Control of Insects.**—The chemistry of insecticides and their physiological effects on insects, man and other animals. Credit, 3.
Prerequisites, Entomology 180 and Pomology 156 or equivalent.

Mr. Sweetman.

223. **Advanced Biological Control.**—The basic fundamental principles, as well as practical application of biological control of insects. A section is devoted to control of pest weeds with insects. Credit, 3.
Prerequisite, Entomology 180 or equivalent.

Mr. Sweetman.

224. **Legislative Control of Insects and Insecticides.**—The legal aspects of prevention, control, and eradication of pests; insecticide laws, and health laws regarding use of insecticides. Emphasis is placed on the importance of basic knowledge of the biology and habits of insects and other pest organisms as related to legal and other methods of control and eradication. Credit, 3.

Mr. Sweetman.

230. Advanced Apiculture.—Necessary background for whatever phase of beekeeping the student desires, equipment permitting. Among such topics available are management, biometry, bee poisoning, pollination. Credit, 2-5.
Prerequisites, Entomology 166, 185 or equivalent.

Mr. Shaw.

240. Coccidology.—Lecture and laboratory work on scale insects; their relationships, structure, habits, technique of mounting, identification, damage, and control. Credit, 2.
Prerequisite, Entomology 26 or equivalent.

Mr. Hanson.

241. Classification of Minor Orders of Insects.—Laboratory work in taxonomy of the many groups with relatively few species. Credit, 2.
Prerequisites, Entomology 26, 155, 156, 157 or equivalent.

Mr. Hanson.

242. Advanced Arthropod Taxonomy.—Classification of various groups of insects and insect allies, indicating the latest methods in taxonomy and the principles of classification. In addition to groups listed below, work may be offered in such groups as Ephemerida, Plecoptera, Diptera, Lepidoptera, and others upon special arrangement in advance. Credit, 1-9.

The Staff.

A. Culicidae	Miss Smith
B. Advanced taxonomy of immature stages	Miss Smith
C. Ticks	Mr. Shaw
D. Siphonaptera	Mr. Shaw
E. Simuliidae	Mr. Shaw
F. Tabanidae	Mr. Shaw
G. Tipulidae	Mr. Alexander
H. Acarina (other than ticks)	Mr. Weidhaas
I. Other groups of insects	The Staff

245. Historical Entomology.—Lives and works of outstanding entomologists of the world; history of entomology; and classification of insects. Credit, 3.
2 credits 1st semester, 1 credit 2nd semester.
Prerequisites, Entomology 26, 153.

Mr. Alexander.

248. Principles of Systematic Entomology.—The International Code of Zoological Nomenclature, and the Opinions thereon; type categories; the species concept; major insect collections; leading entomological specialists. Credit, 3.
2 credits 1st semester, 1 credit 2nd semester.
Prerequisites, Entomology 26, 155, 156.

Mr. Alexander.

250. Advanced Medical Entomology.—Training in whatever phase of medical entomology a student selects (materials and references permitting). Such work might incude systematic studies of a family or order of insects involved in medical entomology, the biology of any particular group of insects, control measures. Credit, 2-5.
Prerequisites, Entomology 174 or its equivalent.

Mr. Shaw.

270. Advanced Research Methods.—The principles, methods of analysis, and presentation of results of research. A section is devoted to statistical treatment and analysis of research. Credit, 3.
Prerequisites, Research portion of Entomology 181 or equivalent.

Mr. Sweetman.

280. Seminar.—Reports on the current literature of entomology; special reports by resident and visiting speakers. Credit, 1 each semester.
One class hour. (Maximum for M.S. Candidates, 2)
(Maximum for Ph.D. Candidates, 4)
Mr. Weidhaas.

300. Thesis, Master's Degree.—Original work on one or more topics in insect morphology, systematic entomology, medical entomology, insect physiology, insecticides, biological control or apiculture. The thesis requires from one-half to two-thirds of the total working time of the student in his major field. Credit, 10.

400. Thesis, Ph.D. Degree.—Original work on one or more topics in insect morphology, systematic entomology, medical entomology, insect physiology, insecticides, biological control or apiculture. The thesis requires from one-half to two-thirds of the total working time of the student in his major field.
Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

183. Arthropods Other Than Insects.—Arthropods from the phylogenetic standpoint, with special reference to their relationship to the origin and evolution of insects. Credit, 3.
Mr. Hanson.

185. Advanced Beekeeping.—Management, processing honey and wax, bee diseases, and improvement of honeybees. Credit, 3.
Prerequisite, Entomology 166.
Mr. Shaw.

187, 188. Special Problems in Entomology.—Problem work in many fields, as apiculture, biological control and insectary practice, insecticides, morphology, and classification. Credit, 1, 2, or 3.
Prerequisites, Entomology 26, 53, 155, 157, and should be preceded or accompanied by other courses in the restricted field of the problem.
The Staff.

189. Entomological Techniques.—Techniques in the mounting and preservation of insects for study and display by means of fluids, slides, plastics, pinning, and other methods. Credit, 2.
Prerequisite, Entomology 26.
Miss Smith.

190. Evolution.—A course in orientation. Lectures consider evolution of both organic and inorganic matter with attention to the evolution of human behavior and to the effect of evolutionary concepts on human philosophy. Extra supplementary reading required of graduate students. Credit, 2-3.
Mr. Hanson.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Zoology 174. Limnology. Credit, 4.
Miss Traver.

Plant Pathology 190. Insect Transmission of Plant Diseases. Credit, 3.
Mr. Banfield.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Entomology)

151. Pests of Special Crops. Credit, 3.
Mr. Weidhaas.

153. Applied Entomology. Credit, 3.
Mr. Shaw.

155, 156. Classification of Insects. Creedit, 3.
Mr. Alexander, Miss Smith.

157. Insect Morphology. Credit, 4.
Mr. Hanson.

160. Structural Pest Control. Credit, 2.
Mr. Sweetman.

166. Introductory Beekeeping. Credit, 3.
Mr. Shaw.

172. Forest and Shade-Tree Insects. Credit, 3.
Mr. Hanson.

174. Medical Entomology. Credit, 3.
Mr. Shaw.

179. Animal Ecology. Credit, 3.
Mr. Sweetman.

180. Biological Control or Chemical Control of Insects. Credit, 2 or 3.
Mr. Sweetman.

181. Physiological Entomology. Credit, 3.
Mr. Sweetman.

Plant Pathology

Walter Banfield, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

204. Forest Pathology.—The diseases of trees and the decay of forest products. Credit, 4.
Prerequisites, Plant Pathology 151 and Botany 166.
Mr. Banfield.

205, 206. Advanced Plant Pathology.—The biological problems that underlie the diseased state in plants and the development of disastrous epiphytotics. Credit, 2-4 each semester.
Mr. Banfield.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

151, 152. Plant Pathology.—The nature, causes and control of plant diseases. Credit, 3 each semester.
Mr. Banfield.

169. Forest and Shade Tree Pathology.—The nature, cause and control of the principal types of disease in trees including decay of forest products, standing and structural timber. Credit, 3.
Mr. Banfield.

175. Methods in Plant Pathology.—General techniques and specialized methods used in the investigation of plant diseases. 1958-59 and each alternate year. Credit, 3.
Prerequisite, one semester of Plant Pathology.
Mr. Banfield.

190. Insect Transmission of Plant Diseases.—Lectures on intricate interrelationships of insects, plants, and microorganisms, with particular emphasis on the basic role played by insects in inception, distribution and perpetuation of plant diseases. Credit, 3.
Mr. Banfield.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Botany 163, 164. Comparative Morphology of Fungi. Credit, 3 each semester.
Mr. Bigelow.

Botany 166. General Mycology. Credit, 3.
Mr. Bigelow.

FOOD SCIENCES

Bacteriology, Chemistry, Dairy and Animal Science, Food Technology, and the School of Home Economics (Foods and Nutrition).

This is a cooperative major designed for Ph.D. candidates who wish to prepare for research in various phases of the food sciences. It is designed to give a broader and somewhat less intensive scientific base for research or its application in industry than is possible when a student takes most of his major work in one department only. This plan provides for a candidate to place the major emphasis in one of the five departments cooperating which may or may not offer a Ph.D. degree in the department.

Courses, if properly selected, will satisfy both major and minor requirements. The proportionate contribution of each department will depend upon the student's special interests within the field but a minimum of six credits must be earned in each of the departments contributing to this major.

Candidates for the Ph.D. degree in the Food Sciences are assigned to an advisory committee composed of the heads of the five departments concerned, with the head of the department in which the thesis research is planned serving as chairman. This advisory committee will direct the student's progress, conduct the preliminary examination, and approve the thesis subject. The guidance committee, appointed by the Scholarship Committee of the Graduate School Council with the staff member who is directing the thesis serving as chairman, will have direct charge of all matters pertaining to the thesis investigation.

The 30 major course credits required for the Ph.D. must be distributed among at least 3 of the 5 departments concerned. The minimum requirement of six credits in other departments may be satisfied by either major or minor credits. Courses offered by the 5 departments which are acceptable for major credit toward the degree in Food Sciences have been designated by the advisory committee as follows:

400. Thesis, Ph.D. Credit, 30.

Bacteriology

202. Advanced Bacterial Physiology.
203. Bacterial Cytology.
205. Advanced Immunology.
206. Microbiological Fermentations.
207. Virology.
208. Seminar.
213. Antibiotics.
214. Microbial Genetics.
215. Antiseptics and Disinfectants.
181. General Applied Bacteriology.
182. Quantitative and Qualitative Bacteriology.
185. Immunology.
195. Studies of Special Microbial Groups.
198. Bacterial Physiology.

Chemistry

237. Biocolloids.
239. Chemistry of Natural Products.
165, 166. Physical Chemistry. (For minor credit only)
179. Biochemistry. (For minor credit only)
183. Advanced Quantitative Analysis.
193, 194. General Biochemistry.

Dairy and Animal Science

175. Dairy Chemistry.
200. Problems in Dairy Technology.
202. Advanced Dairy Chemistry.
209, 210. Seminar.

Food Technology

203. Research Project.
209, 210. Thermal Processing of Foods.
216. Food Packaging.
221. Edible Fats and Oils.
241. Food Acceptance—Theory and Methodology.
250. Food Colorimetry.
271. Seminar Review of Current Literature and Research.
285, 286. Fisheries Technology.
161, 162. Industrial Practices.
191, 192. Food Analysis.
198. Sensory Evaluation Methods.

Foods and Nutrition

203. Advanced Nutrition—Metabolism of the Major Foodstuffs.
204. Advanced Nutrition—Vitamins and Minerals.
205. Laboratory Methods and Techniques in Nutrition.
207. Problems in Nutrition.
212. Nutrition Seminar.
189. Diet Therapy.

FOOD TECHNOLOGY

WILLIAM B. ESSELEN, major adviser.

Graduate students who wish to major in Food Technology may not be admitted to candidacy for an advanced degree until such time as the undergraduate requirements in basic sciences and Food Technology have been met substantially.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Research Problem.—Mainly for candidates for the Master of Science degree who do not write a thesis. Original research expected. The problem will be carried out as a thesis but will be less extensive. Two bound copies (flexible binding permissible) of a written report of the study are required by the Department. Credit, 3-6.

THE STAFF.

203. Research Project.—Research on problems not related to the thesis. For Ph.D. candidates only. Credit, 1-4.

THE STAFF.

209, 210. Thermal Processing of Foods.—Biological and Physical Aspects. The factors affecting heat transfer in canned goods. Heating characteristics of canned foods packed in tin, glass, and other containers. Determination of thermal death times of spoilage micro-organisms. Derivation of processing times and temperatures. Causes of spoilage and container failure. Principles of retort operation and control; instrumentation.

First semester—2 lectures or conferences. Credit, 2.
Second semester—1 lecture, one 4-hour laboratory. Credit, 3.
Prerequisites, Food Technology 162 and Bacteriology 182.

MR. ESSELEN.

216. Food Packaging.—The characteristics of all packaging materials including flexible films and how they meet the package requirements of various food products. Methods of testing for structural quality and performance, moisture and gas transmission, and other properties. Consideration of adhesives, lacquers and closures. Occasional lectures by qualified representatives of industry. Plant visits in non-scheduled hours.

One 4-hour laboratory period; one or more class or discussion hours.
Prerequisite, Food Technology 162. Credit, 3.

MR. LEVINE.

221. Edible Fats and Oils.—The production, processing and uses of edible fats and oils and their chemical nature in relationship to stability. The problem of oxidation and rancidity with emphasis on cause of deterioration and methods of stabilization. Credit, 2.

One class hour, one 2-hour laboratory period.

THE STAFF.

241. Food Acceptance—Theory and Methodology.—Objective and subjective methods of evaluation of the quality of processed foods. Physical and chemical means of expressing quality of a product. Sensory methods including difference-preference tests, panel tests, threshold tests, etc. Application of statistical methods including control chart techniques. Psychological and physiological factors affecting flavor appraisal.

One lecture; one conference. Credit, 3.
Prerequisites, Food Technology 162, 192 and 198.

MR. FAGERSON.

FOOD TECHNOLOGY

250. Food Colorimetry.—Composition and properties of food colorants. Methods of measurement and specification of color in raw and processed foods. The nature, cause and control of color changes in the handling, processing and storage of food products. The application of the Munsell, C.I.E. and other color systems to commercial quality control and laboratory inspection under governmental grading standards.
One lecture, one 4-hour laboratory. Credit, 3.
Prerequisites, Food Technology 191 and 192; Chemistry 165 and 166.
Mr. Livingston.

271. Seminar.—Review of current literature and research.
Credit, 1 each semester.
Maximum credit, 6.
The Staff.

285, 286. Fisheries Technology.—Marine products of commerce. Processed seafoods. Canning, curing, freezing and refrigeration. Spoilage problems. By-products. Chemical and microbiological aspects. Scientific literature. Industrial problems. Credit, 2-3 each semester.
One class hour plus laboratory work to be arranged.
The Staff.

295. Biological and Toxicological Assay of Foods.—Laboratory training and practice in making animal and microbiological assays of food constituents important in human and animal nutrition. Added chemicals in foods.
Credit, 2-5.
Prerequisites, Chemistry 179 and Food Technology 192.
Mr. Sawyer.

300. Thesis, Master's Degree. Credit, 10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161, 162. Industrial Practices.—Advanced laboratory and pilot plant work in the production of canned, frozen and dehydrated fruits, vegetables, meat, and fish products. The theory and practice in manufacturing jams, jellies, and condiments as well as fermented, salted and smoked foods; cereal products and soups. Credit, 3 each semester.
One class hour, one 4-hour laboratory period.
Mr. Levine.

191, 192. Analysis of Food Products.—Factory and laboratory methods. Grades and quality factors; physical, chemical, microbiological and microscopical methods, and interpretation of results. Government and trade standards; Federal and State food regulations; mold and insect counts; plant control procedures. Food preservatives and flavorings.
One 4-hour laboratory period, two class hours. Credit, 3 each semester.
Prerequisites, Chemistry 30 and Food Technology 152 or 175.
Mr. Livingston.

198. Sensory Evaluation Methods.—An introduction to sensory measurements in the evaluation and acceptance of foods. Panel tests and their statistical interpretation; taste, odor, color, and texture measurements; application to food quality control and grading. Credit, 2.
One class hour; one 2-hour laboratory period.
Mr. Fagerson.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agricutural Engineering 260. Agricultural Processing. Credit, 3.
Mr. Zahradnik.

Bacteriology 206. Microbiological Fermentation. Credit, 3.
Mr. Czarnecki.

Chemical Engineering 177. Elements of Unit Operations. Credit, 3.
Mr. Lindsey.

Chemistry 193, 194. General Biochemistry. Credit, 4 or 8.
Mr. Little.

Chemistry 237. Biocolloids. Credit, 3.
Mr. Bennett.

Chemistry 239. Chemistry of Natural Products. Credit, 3.
Mr. Little and Mr. McWhorter.

Home Economics 203. Advanced Nutrition. Credit, 3.
Miss Mitchell.

Home Economics 204. Advanced Nutrition. Credit, 3.
Mrs. Wertz.

Home Economics 205. Laboratory Methods and Techniques in Nutrition. Credit, 3.
Mrs. Wertz.

Olericulture 173. Marketing and Storage of Vegetable Crops. Credit, 3.
Mr. Snyder.

Olericulture 174. Marketing Practices. Credit, 3.
Mr. Snyder.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Food Technology)

151. Introductory Course.—A general elementary course covering food economics, production, distribution and processing. Applications of fundamental science to the food industries. Laboratory exercises cover both the theory and practice of canning, freezing, and dehydration. Principles of packaging. Fruit and vegetable products are prepared and graded. Credit, 3.
One class hour, one 4-hour laboratory period.

Mr. Averill.

152. Food Products and Adjuncts.—A continuation of 151. The laboratory work includes pickles and pickle products, maple products, citrus products, fruit syrups, soups, condiments and the preservation of meats, poultry and vegetables. The properties and uses of sugars, syrups, salt, enzymes, pectin, chemical preservatives and anti-oxidants. Practice in the use and handling of instruments and equipment. Credit, 3.
Two class hours, one 2-hour laboratory period.

Mr. Averill.

175. Food Preservation.—Intended only for those who desire a survey of the field in a condensed form. Not open to Food Technology majors.
One class hour, two 2-hour laboratory periods. Credit, 3.

Mr. Livingston.

FORESTRY

ARNOLD D. RHODES, major adviser.

Applicants for admission who plan to major in forestry customarily should have completed an undergraduate major in that field. An exception may be made in the case of individuals having a strong background in a related discipline or the basic sciences. Candidates for a Master's degree majoring in forestry ordinarily must complete a thesis; exceptions will be made in unusual circumstances. Emphasis may be in the area of forest soils, forest ecology, silviculture, or marketing.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Special Problems.—Selected research problems in forestry not related to the candidate's thesis. Credit, 3.
THE STAFF.

201. Advanced Forest Soils.—The relation of soils to tree growth and other environmental factors with particular emphasis on research methods, site evaluation, water relationships, and fertility; laboratory and field exercises. Credit, 3.
MR. MADER.

202. Aerial Photo-Interpretation.—Advanced aerial photo-interpretation emphasizing the analysis of natural vegetation, especially forest vegetation; a wide selection of aerial photographs is available for interpretive study and cartography. Credit, 3.
Prerequisite, Forestry 171 or equivalent. MR. MACCONNELL.

203. Advanced Forest Ecology.—Forest environment, how it may be altered, and the effect of such alteration upon forest establishment and development.
Prerequisite, Forestry 153 or equivalent. Credit, 3.
MR. RHODES.

300. Thesis, Master's Degree. Credit, 6-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

152. Properties of Wood.—The physical and chemical characteristics of wood in relation to its use; the influence of growth upon wood properties; methods of testing. Credit, 3.
Three class hours. MR. ———.

153. Silvics.—Forest ecology as a foundation for silvicultural practice: the physiological basis of forest ecology; environmental factors, their effect upon vegetation, and how they are influenced by it; the development and silvical habits of the individual tree; the development, characteristics and classification of forest communities; plant indicators; methods for the study and analysis of vegetation and its environment. Credit, 3.
Two class hours, one 4-hour laboratory period. MR. RHODES.

154. Forest Soils.—The characteristics, development, and maintenance of forest soils; their relationship to applied silviculture and forest productivity; the literature of forest soils with special reference to American experience.
Three class hours. Credit, 3.
Mr. Mader.

155. Elements of Forest Mensuration.—Methods of determining the volume and value of forest growing stock; type mapping as it pertains to timber cruising; field work in mapping and timber estimating on a forest realistic in size and condition; the preparation of inventory reports. Given each summer and in alternate years the first semester. Credit, 3.
Two class hours, one 4-hour laboratory period.
Summer course: three 44-hour weeks. Mr. Bond and Mr. ———.

156. Principles of Silviculture.—The methods of establishing and developing forest stands: intermediate cuttings and reproduction systems; field work in applied silviculture. Credit, 3.
Two class hours, one 4-hour laboratory period. Mr. Rhodes.

157. Forest Economics and Policy.—The forest as a resource yielding direct forest values and social benefits; the history of American forestry; the development of a forest policy and the role of the forest in the American economy.
Three class hours. Credit, 3.
Mr. Bond.

159. Forest Protection.—The principles of protecting forests from harmful agencies with particular emphasis on the prevention and control of forest fires, and injury from insects and diseases; other agencies are treated in accordance with their importance. Credit, 3.
Three class hours. Mr. Abbott.

171. Aerial Photogrammetry.—Principles of photogrammetry and the application of aerial photography in forest management, wildlife, biology, engineering, geology, and other fields concerned with large land surfaces; laboratory exercises in photographic interpretation and map making. Credit, 3.
Two class hours, one 4-hour laboratory period. Mr. MacConnell.

174. Lumber Manufacture and Distribution.—The lumber industry: milling and processing; log and lumber grading; lumber storage and distribution.
Three class hours. Credit, 3.
Mr. ———.

175. Forest Products.—A survey of the principal forest products, their manufacture and distribution. Credit, 3.
Three class hours. Mr. ———.

178. Harvesting of Forest Products.—Theory and practice of harvesting forest products in the several forest regions of the United States and Canada; field trip to New Hampshire and Maine. Credit, 3.
Summer course: three 44-hour weeks. Mr. Bond and Mr. MacConnell.

180. Principles of Forest Management.—Multiple-use management; organization of the forest for sustained yield management; forest management plans; forest regulation. Laboratory optional for non-forestry majors. Credit, 3-5.
Three class hours, one 4-hour laboratory period.
Prerequisites, Forestry 155 and 156. Mr. MacConnell.

181. Regional Silviculture.—The practice of silviculture in the several forest regions of the United States and Canada. Credit, 3.
Three class hours. Mr. Rhodes.

182. Artificial Propagation of Forests, and Forest Tree Improvement.—Reproductive characteristics of forest trees; artificial propagation of forest stands by direct seeding and forest planting; nursery management and problems; fundamentals of tree improvement through provenance tests; selection of superior phenotypes; hybridization. Credit, 3.
Two class hours, one 4-hour laboratory period. Mr. Abbott.

184. Advanced Forest Mensuration.—The analysis of growth and yield in forest stands; construction of standard volume tables and yield tables; plotless cruising and continuous forest inventory; elementary statistics as applied to forest measurements. Credit, 3.
Two class hours, one 4-hour laboratory period.
Prerequisite, Forestry 155. Mr. ———.

185. Wood Seasoning and Preservation.—Properties of wood in relation to drying and preservation; theory and practice of air seasoning, kiln drying, and preservative treatment. Credit, 3.
Three class hours. Mr. ———.

COURSE FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Forestry)

151. Forest Management of Watersheds.—Forest and water factor relationships; the improvement of watershed forests through applied silviculture; forest protection measures. Credit, 3.
Three class hours. The Staff.
Prerequisite, recommendation of student's major adviser.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agricultural Economics 155. Marketing.	Credit, 3.
Agricultural Engineering 173. Farm Structures.	Credit, 3.
Agronomy 263. Chemistry of the Soil.	Credit, 4.
Agronomy 264. Experimental Methods in Agronomy.	Credit, 3.
Agronomy 157. Soil Formation.	Credit, 3.
Agronomy 179. Soil Physics.	Credit, 3.
Agronomy 184. Soil Chemistry.	Credit, 5.
Botany 200. Special Problems.	Credit, 1-5.
Botany 202, 203. Advanced Plant Physiology.	Credit, 2-4.
Botany 207. Advanced Plant Ecology.	Credit, 3.
Botany 181. Plant Ecology.	Credit, 3.
Botany 182. Plant Geography	Credit, 3.
Botany 189. Plant Cytogenetics.	Credit, 3.
Business Administration 211. Accounting in Management.	Credit, 3.
Business Administration 222. Marketing Management.	Credit, 3.
Chemistry 181. Organic Chemistry.	Credit, 3.
Chemistry 183. Advanced Quantitative Analysis.	Credit, 3.
Entomology 212. Geographical Distribution of Animals and Plants.	Credit, 3.
Geology 189. Geomorphology.	Credit, 3.
Plant Pathology 152. Plant Breeding Methods.	Credit, 3.
Statistics 177. Elementary Experimental Statistics.	Credit, 3.
Statistics 179. Elementary Economics Statistics.	Credit, 3.
Statistics 180. Advanced Statistical Method.	Credit, 4.

GEOLOGY

H. T. U. Smith, major adviser.

Requirements for the M.S. degree are as follows:

1. A minimum of 60 credits in geology, including both undergraduate and graduate work.
2. Courses in related sciences equivalent to those required for undergraduate majors: one year each of chemistry and physics, one semester of zoology, and mathematics through trigonometry and analytic geometry.
3. Proficiency in technical writing.
4. At least six weeks of training in field geology.
5. Graduate credits in geology as required by the Graduate School.
6. A thesis based at least in part on field study, and representing an original contribution to geologic knowledge.
7. Satisfactory performance on a final examination covering the topics listed below:
   a. A general knowledge of the several fields of physical and historical geology, field and laboratory techniques, and sources of geologic information.
   b. A more advanced knowledge of the field or fields which constitute background for the thesis.
   c. Defense of the thesis.

At the beginning of the first semester in residence, new graduate students are given placement examinations covering fields of geology included in their undergraduate program. These examinations provide a partial basis for planning the student's course of study.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Special Problems.—Either or both of the following options may be selected:

A. Independent study—guided reading and/or laboratory study in subjects or techniques not covered by other courses in the department.
B. Research—original library, field, and/or laboratory investigation of a selected problem.

Prerequisites, 45 credits in geology and consent of department head and of instructor concerned. Credit, 2-6.
The Staff.

201. Optical Mineralogy.—Theory and practice of studying minerals with the petrographic microscope. Laboratory work includes preparation of thin sections of minerals and rocks and study of their optical properties by means of polarized light. Credit, 3.
Prerequisites, Geology 42, Physics 25 and 26. Mr. Nelson.

203. Igneous Petrology.—Description, classification, origin, and alteration of igneous rocks. Examination of rocks in hand specimen and in thin section under the microscope. 1959-60 and each alternate year. Credit, 3.
Prerequisites, Geology 156 and 201. Mr. Farquhar.

205. Sedimentary Petrology.—Study of the natural history of sedimentary rocks by all available laboratory methods. All physical rock properties are subjected to critical analysis, and resulting data are interpreted with special reference to origin of the rocks studied. Credit, 2.
Prerequisites, Geology 201 and 174. Mr. Dodge.

206. **Metamorphic Petrology.**—Description, classification and origin of metamorphic rocks. Microscopic study of suites of thin sections. Credit, 3.
Prerequisites, Geology 156 and 201. 1958-59 and each alternate year.
Mr. Farquhar.

212. **Sedimentation.**—A critical analysis of modes of origin of the several types of sedimentary rocks. Credit, 3.
Prerequisite, Geology 174. Mr. Dodge.

213. **Geophysics.**—The physics of the earth and the gravitational, magnetic, electrical, and seismic methods of geophysical exploration. Laboratory work consists of problems and computations. Credit, 3.
Prerequisites, Geology 33 and 156, Math 10, Physics 25 and 26. Mr. Rice.

214. **Mineral Fuels.**—Geologic occurrence of oil, gas, and coal. Laboratory work consists of problems related to petroleum geology and the recovery of fluid hydrocarbons. Credit, 3.
Prerequisites, Geology 33, 42 and 178. Mr. Webb.

216. **Economic Geology.**—Geology, distribution, and utilization of metallic ores and selected nonmetallic deposits; influence of mineral resources on national and world affairs; laboratory study of representative specimens, geologic maps, and reports on typical mining districts. Two class hours, one 2-hour laboratory, and field trip. Credit, 3.
Prerequisites, Geology 33, 42 and 156. Mr. Farquhar.

220. **Stratigraphic Paleontology.**—Application of selected fossils and faunal assemblages to stratigraphic correlation, and paleoecological and paleogeographic analysis, with reference to evolutionary trends. Credit, 2.
Prerequisites, Geology 163 and 178. Mr. Johansson.

221. **Animal Micropaleontology.**—Principles of animal micropaleontology with emphasis on the use of animal microfossils in stratigraphic investigations.
Prerequisites, Geology 163 and 178. Credit, 3.
Mr. Johansson.

222. **Plant Micropaleontology.**—Principles of plant micropaleontology with emphasis on the use of plant microfossils in stratigraphic investigations. Not offered 1958-59. Credit, 3.
Mr. ———.

228. **Map Interpretation.**—A laboratory study of the various types of maps used by geologists, with special reference to the identification and interpretation of landforms and structures. Credit, 2.
Prerequisites, Geology 33, 172 and 189. Mr. Smith.

230. **Advanced Geomorphology.**—A critical study of selected topics and current problems in geomorphology. Credit, 2.
Prerequisite, Geology 189. Mr. Smith.

234. **Regional Geology of North America.**—Stratigraphic and tectonic evolution of North American Continent. Credit, 2.
Prerequisites, Geology 2, 33 and 178. Mr. McGill.

236. **Advanced Structural Geology.**—A survey of the dynamics of crustal deformation, including isostasy, orogeny, experimental studies, and mechanical principles. Credit, 2.
Prerequisites, Geology 33, 172 and 178. Mr. McGill.

238. Advanced Photogeology.—A laboratory study of surface expression as a key to subsurface phenomena as illustrated by specific areas. Credit, 2.
Offered every other year alternating with Geology 230. Mr. Smith.
Prerequisites, Geology 189 and 191.

241. Seminar.—Review of current literature or discussion of selected topics. Credit, 1 each semester.
Maximum credit, 2.
The Staff.

250. Geochemistry.—Principles of geochemistry and interpretation of geochemical data in relation to geological processes and to the origin and history of the earth. Credit, 2.
Prerequisites, Geology 42, 156, one year of college chemistry and permission of instructor. Mr. Nelson.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

178. Principles of Stratigraphy.—Principles of stratigraphic correlation as related to the major rock units of the United States and Europe. Credit, 3.
Prerequisite, Geology 174. Mr. Dodge.

189. Geomorphology.—Origin and development of landforms in relation to geological processes, climatic environment, and tectonic history. Application of geomorphic methods to interpretation of Cenozoic geologic history.
Two class hours; one 2-hour laboratory period. Credit, 3.
Prerequisites, Geology 1, 2 and 33. Mr. Smith.

191. Photogeology.—A laboratory study of the instruments and methods employed in making measurements and preparing base maps and geologic maps from vertical and oblique aerial photos. Credit, 3.
Two 3-hour laboratory periods. Mr. Smith.
Prerequisites, Geology 33 and 172.

194. Pleistocene Geology.—Geochronology of Pleistocene time as related to climatic changes and their influence on glaciology, erosional and depositional processes, landforms, sedimentary deposits, shifting sea level, and the paleontological record. Field trips by arrangement. Credit, 3.
Two class hours; one 2-hour laboratory period. Mr. Smith.
Prerequisites, Geology 1 and 2.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Geology)

150. Engineering Geology.—Materials and surface features of the earth and their relation to engineering problems; map reading as related to the phenomena of physical geology. Credit, 3.
Two class hours; one 3-hour laboratory period. Mr. Farquhar.

156. Lithology.—A descriptive study of the classes of rocks with reference to manner of origin, modes of occurrence, structural features and the chemical and petrographic distinction within each group. Credit, 3.
One class hour; two 2-hour laboratory periods. Mr. Nelson.
Prerequisites, Geology 1 and 42.

163. Invertebrate Paleontology.—History, development and identification of invertebrate animal fossils. Field trips by arrangement. Credit, 3.
Prerequisites, Geology 2 and Zoology 1. MR. JOHANSSON.

164. Plant Paleontology.—History, development and identification of plant fossils. Field trips by arrangement. Not offered in 1958-59. Credit, 3.
MR. ———.

172. Geologic Field Mapping.—An introduction to the instruments and techniques used in field mapping, and their application to the geologic mapping of selected areas. Eight field hours, by arrangement. Credit, 3.
Prerequisites, Geology 33 and 156, or permission of instructor. THE STAFF.

174. Sedimentology.—Composition, classification, and origin of sedimentary rocks, including discussion of source area, mode of transportation, deposition and diagenesis. Credit, 2.
Prerequisites, Geology 1, 2 and 42. MR. DODGE.

COURSES IN OTHER DEPARTMENTS FOR WHICH GRADUATE CREDIT MAY BE GIVEN

Agronomy 157. Soil Formation. Credit, 3.

Botany 181. Plant Ecology. Credit, 3.

Entomology 212. Geographical Distribution of Plants and Animals. Credit, 2 1st semester. 1 2nd semester.

Zoology 153. Principles of Genetics. Credit, 3.

Zoology 170. Invertebrate Zoology. Credit, 3.

Zoology 174. Limnology. Credit, 4.

GERMAN

COURSES FOR MINOR CREDIT ONLY

151. Nineteenth Century Prose I.—The "Novelle" from the death of Goethe to 1890 (early realism to naturalism) with emphasis on literary and social forces in the work of Tieck, Stifter, Keller, and others. Credit, 3.
Three class hours. MR. HELLER.

152. Poetry and Drama of the Nineteenth Century II.—The development of the drama and of lyric poetry from 1830 to 1890 with special emphasis on dramatic works of Grillparzer, Hebbel, and Hauptmann and the poetry of Mörike, Storm, and C. F. Meyer. Credit, 3.
Three class hours. MR. LEA.

153. Twentieth Century Prose I.—Main literary currents in contemporary German prose from Nietzsche to Hesse with particular attention to the work of Thomas Mann, Kafka, and Werfel. Credit, 3.
Three class hours. MR. LEA.

154. Poetry and Drama of the Twentieth Century II.—Reading and discussion of significant lyrical works of Hofmannsthal, George, and Rilke and representative dramas by Hauptmann and Georg Kaiser. Credit, 3.
Three class hours. MR. HELLER.

155. Storm and Stress I.—Storm and stress in German literature centering in the young Goethe. Credit, 3.
Three class hours. Mr. Ellert.

156. Romanticism II.—The poetry and prose writings of the romantic period from Novalis to Heine. Credit, 3.
Three class hours. Miss Schiffer.

157. Goethe's Faust I. Credit, 3.
Three class hours. The Staff.

158. Middle High German II.—Reading of Middle High German texts with an introduction to grammar. Credit, 3.
Three class hours. Mr. ———.

159. The Germanic Languages I.—An introduction to General and Germanic philology for German and English majors; a survey of the relationship between German, English, and the other Indo-European tongues and of the historical development of German and English as the two major Germanic literary languages. Credit, 3.
Three class hours. Mr. ———.

160. The Classical Period II.—Representative works by Lessing, Goethe, and Schiller. Credit, 3.
Three class hours. Mr. Ellert.

168. German Literature of the Middle Ages II.—The literature of the German language from the earliest literary documents to the 15th century, with readings in modern German translation of the Nibelungenlied, Gudrun, Parzival, Tristan, Der arme Heinrich, and the lyrics of Walter von der Vogelweide. Credit, 3.
Three class hours. Mr. Ellert.

222. Advanced Spoken German. Credit, 3.
Prerequisites, German 79 and 80 or their equivalent as determined by a qualifying examination. Miss Schiffer and Mrs. Trahan.

GOVERNMENT

John S. Harris, major adviser.

In addition to the general requirements for the Master of Arts degree, candidates in Government must possess a reading knowledge of a foreign language approved by the department or an adequate knowledge of statistics where appropiate. An acceptable master's thesis is also required.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

250. Public Administration.—Selected problems in public administration. Emphasis upon reading advanced works in the field; each student will undertake a research project. Credit, 2.
Prerequisite, Government 161 or 178. Mr. Harris or Mr. Mainzer.

260. Current Problems of International Relations and Foreign Politics.—Analysis of major problems in international relations and comparative government. Credit, 3.
Prerequisite, Government 153, 173, or 174.
Mr. Allen, Mr. Braunthal and Mr. Harris.

270. Public Law.—Study of selected topics in constitutional law. Credit, 3.
Prerequisite, Government 165. MR. BETH.

275. Politics and the Legislative Process.—Selected topics relating to American politics, political parties, elections and the legislative process. Credit, 3.
Prerequisite, Government 163. MR. GOODWIN AND MR. BETH.

300. Thesis, Master's Degree. Credit, 6.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. Municipal Government.—A survey of the governmental structure and function of American municipalities. Credit, 3.
Three class hours. MR. GOODWIN AND MR. GILLESPIE.

152. American Foreign Policy.—Constitutional, political and administrative considerations which influence the formulation and execution of American foreign policy. Special emphasis on current issues. Credit, 3.
Three class hours. MR. ALLEN.

153. International Relations.—The nation-state system and conceptions of national interest in modern world politics. The forms and distribution of power by which states seek to implement national interests. The making of foreign policy and methods of adjusting international conflict. Current international problems. Credit, 3.
Three class hours. MR. ALLEN.

154. State Government.—State politics, organization and functions with emphasis on the role of the state in our federal system. Credit, 3.
Three class hours. MR. GOODWIN.

155. The Presidency in American Government.—The growth of the executive in United States Government. Varying conceptions of the presidential office. Constitutional and political aspects of the office in legislation, administration and conduct of foreign and military affairs. The president as a party leader. Credit, 3.
Summer School only. MR. GOODWIN.

156. The Legislative Process.—The role of the legislature in national and state government. The functions of legislatures; legislative procedures; the role played by political parties and pressure groups in the legislative process. Emphasis on research. Credit, 3.
Three class hours. MR. GOODWIN.

157. The Government and Politics of Russia.—The development, organization and functioning of the Communist party; governmental organization and the administrative process; terror as a system of power; organization for governmental control in industry and agriculture; Soviet foreign policy; its formation and execution. Credit, 3.
Prerequisite, Government 25. MR. HARRIS.

161. Public Administration.—Organization and management in modern government, with emphasis on the bureaucracy's role in public policy formation.
Three class hours. Credit, 3.
MR. MAINZER.

162. Administrative Law.—Governmental activities in the regulation of industry, agriculture, and labor, with emphasis on the legal framework within which these activities operate. Credit, 3.
Three class hours. MR. MAINZER.

163. Political Parties and Elections.—The American political process, with emphasis on parties, pressure groups, and public opinion. Credit, 3.
Three class hours. Mr. Goodwin.

165. Constitutional Law.—An historical study of the United States Constitution as interpreted by decisions of the Supreme Court. Credit, 3.
Three class hours. Mr. Beth.

166. American Political Thought.—The development of American political thought from Colonial times to the present. Credit, 3.
Three class hours. Mr. Harris and Mr. Beth.

168. International Law.—The origin, character, and function of international law. Credit, 3.
Three class hours. Mr. Braunthal.

170. International Organization.—International organization in the twentieth century, with emphasis upon the United Nations and regional organizations. Credit, 3.
Three class hours. Mr. Braunthal.

171. Ancient and Medieval Political Thought.—The development of political thought and its relation to cultural and institutional growth from the time of the Greeks to the end of the Middle Ages. Credit, 3.
Three class hours. Mr. Tinder.

172. Modern Political Thought.—The development of political thought and its relation to cultural and institutional growth from the rise of the modern state to the present. Credit, 3.
Three class hours. Mr. Tinder.

173. Comparative Government.—An historical and functional analysis of the institutions of government in modern democracies and dictatorships.
Prerequisite, Government 26. Credit, 3.
Three class hours. Mr. Allen and Mr. Harris.

174. Comparative Political Parties and Politics.—The ideology, structure and dynamics of diverse types of political parties, or electoral systems and of party systems in an effort to suggest interrelationship. Credit, 3.
Three class hours. Mr. Allen and Mr. Harris.

176. Public Opinion in Politics.—Opinion and communication as aspects of the political process with emphasis upon communication through mass media. The relations between mass attitudes and communication and political institutions and the formation of public policy. Credit, 3.
Three class hours. Mr. Mainzer.

178. Municipal Administration.—Administrative management in American municipalities based on descriptive literature, case materials and personal observation, with particular attention to Massachusetts cities and towns.
Three class hours. Credit, 3.
Mr. Gillespie.

180. Municipal Corporations.—The creation and nature of municipal corporations and the legal problems encountered in the conduct of local government, with special reference to Massachusetts municipalities.
Three class hours. Credit, 3.
Mr. Gillespie.

183. Public Personnel Administration.—Theory, practice, and organization of the personnel functions in governmental administration, including recruitment, testing, classification, compensation, promotions, training, and employee relations. Credit, 3.
Three class hours. Mr. Mainzer.

184. **Governmental Financial Administration.**—Theory, practice, and organization, including budgeting, revenues, debt operations, records administration, purchasing, audits, and financial reporting. Credit, 3.
Three class hours. Mr. ———.

191. **Scope and Methods of Political Science.**—Critical examination of the scope and unity of political science and the significant methodological positions and research techniques. Credit, 3.
Three class hours. Mr. Mainzer.

193, 194. **Seminar.**—Special problems in the field of government.
Three class hours. Credit, 3.
Prerequisite, permission of the Department. The Staff.

INTERDEPARTMENTAL COURSES

Social Science 160. Africa, South of the Sahara.—Recent political, economic, and social developments in the principal countries in Africa south of the Sahara.
Prerequisites, at least two courses in one or more of the following fields: Government, Economics, Sociology. Credit, 3.
Miss Carter.

Social Science 169. India and Southeast Asia.—Recent political, economic, and social developments in India and the countries of South and Southeast Asia.
Prerequisities, at least two semester courses in one or more of the following fields: Government, Economics, and Sociology. Credit, 3.
Mr. Driver.

HISTORY

Theodore C. Caldwell, major adviser.

In addition to the general requirements for the Master of Arts degree, candidates in History must fulfill the following departmental requirements:

A reading knowledge of one foreign language is required.

The requirement concerning a thesis may be fulfilled by one of the following options: (a) completion of a thesis, for ten credits, (b) completion of two seminar courses, with grades of at least B, (c) completion of a five credit thesis and one seminar.

A comprehensive written examination, in fields specified by the Department, is required of all candidates.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

201, 202. **Literature of American History.**—Interpretations of major themes as developed in the works of leading historians. The first course will treat the period through the Civil War; the second, 1865 to the present.
Credit, 4 each semester.
The Staff.

205. **Era of the Confederation and the Constitution.**—The formative years of the American Nation; the evolution of federal and state constitutions; basic political issues and conflicts; the pattern of economic and social development; and the origins of American foreign policy. Credit, 3.
Mr. Davis.

251. Seminar in American Diplomatic History.—Training in historical research. Credit, 3.
Prerequisite, permission of instructor. MR. CARY.

253. Seminar in the Age of Jacksonian Democracy.—Training in historical research. Credit, 3.
Prerequisite, permission of instructor. MR. BROWN.

256. Seminar in the Westward Movement of the United States.—Training in historical research. Credit, 3.
Prerequisite, permission of instructor. MR. DAVIS.

300. Thesis, Master's Degree. Credit, 5 or 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

The following courses are open to students who have fulfilled the prerequisites including History 5 or 6 or their equivalent. Graduate students will be expected to do such additional work as may be prescribed by the instructor.

151. Ancient History.—A general survey of Mesopotamian, Egyptian, Greek and Roman history, with primary emphasis on cultural and intellectual achievements. Credit, 3.
Three class hours. MR. DAVIS.

153, 154. History of Far Eastern Civilization.—An introduction to the civilization and contemporary problems of the Far East. The first semester treats the traditional civilization and the early impact of the west. The second semester deals with revolutionary developments of the twentieth century and the place of the Far East in the world balance of power. Either semester may be elected independently. Credit, 3 each semester.
Three class hours. MR. CRAIG.

156. The History of Modern Russia.—An introduction to the civilization and contemporary problems of Russia. Emphasis on the Soviet period.
Three class hours. Credit, 3.
MR. WOEHRLIN.

157, 158. Hispanic-American History.—The first semester deals with the Colonial period; the age of the "conquistadores," political, economic, and cultural developments, and growth of the independence movement; the second semester with the period of national development from 1810 to the present. Emphasis on the history of Mexico and the more important South American countries. Either semester may be elected independently.
Three class hours. Credit, 3 each semester.
MR. POTASH.

162. Medieval History.—Europe from the collapse of Roman civilization to the Renaissance. Fusion of the Graeco-Roman inheritance, Christianity, and Germanic traditions in the building of Western European civilization. The medieval outlook as expressed in the thought and culture of the High Middle Ages. Credit, 3.
Three class hours. MR. ZEENDER.

163, 164. History of American Thought and Culture.—The basic strands of American thought and their reflection in the development of social life and institutions, literature, and the arts. The first course covers the period to 1865. Either semester may be elected independently.
Three class hours. Credit, 3 each semester.
MR. BROWN.

166. The History of Modern Germany.—The evolution of Germany since 1750 in relationship to Western Europe. Analysis of those economic, social, political, and intellectual influences which determined the unique direction of German cultural development, culminating in a study of the Nazi revolution and contemporary Germany. Credit, 3.
Three class hours. Mr. ———.

169. Europe, 1870-1918.—Internal developments of the principal countries, including political and economic changes, social unrest, and intellectual currents; the development of imperialism; a detailed study of conditions and diplomacy which led to the World War; military history of the War.
Three class hours. Credit, 3.
Mr. Zeender.

170. Europe Since 1918.—Analysis of formative influences in the principal continental states, with emphasis on revolutionary movements of Left and Right; the breakdown of Collective Security; crises leading to World War II; the issues since 1945. Credit, 3.
Three class hours. Mr. Caldwell.

172. History of American Westward Expansion, 1763-1893.—Advance of settlement from the Appalachians to the Pacific and influence of the frontier upon social, economic, and political conditions in the country as a whole.
Three class hours. Credit, 3.
Prerequisite, History 25 or permission of instructor. Mr. Davis.

173. History of the Renaissance.—The later Middle Ages; the Church at the height of power; the rise of nationalities; the Italian towns; the New Learning and its relation to art, science, invention, geographical discoveries; spread and effects of the Renaissance. Credit, 3.
Three class hours. Mr. Ilardi.

174. Age of the Reformation.—The religious changes and the accompanying political upheavals, social, economic, and cultural developments in 16th and 17th century Europe. Credit, 3.
Three class hours. Mr. Dietel.

175. Europe in the Enlightenment, 1685-1789.—Analysis of Western European institutions, society, diplomacy, and thought from the revocation of the Edict of Nantes to the French Revolution. Emphasis on the civilization of the Enlightenment, its social milieu, intellectual setting, religious tendencies, and the growth of revolutionary sentiment. Credit, 3.
Three class hours. Mr. Greenbaum.

177. Modern Britain.—Selected topics in the political, social, and intellectual development of Britain in the nineteenth and twentieth centuries.
Three class hours. Credit, 3.
Prerequisite, History 31, 32 or equivalent. Mr. Caldwell.

178. France since 1789.—Selected formative political crises from 1789 to the present, and their settings in the economic, social and intellectual life of modern France. Credit, 3.
Three class hours. Mr. Gagnon.

179. New England to 1860.—Colonial and early national periods, with emphasis upon the political, social, and economic aspects of life in this region.
Credit, 3.
Mr. Cary.

181, 182. Diplomatic History of the United States.—The development of American foreign relations, 1776 to the present. Either semester may be elected independently. Credit, 3.
Three class hours. Mr. Cary.
Prerequisites, History 25 and 26 or permission of instructor.

190. Bibliography and Historiography.—Instruction in bibliography and evaluation of source materials; critical evaluation of representative historians from ancient to modern times. Credit, 3.
Three class hours. Mr. Greenbaum.

HOME ECONOMICS

Helen S. Mitchell, major adviser.

Graduate work is primarily in the field of Nutrition Research or Home Economics Education. Those applying for graduate work in Nutrition should have an undergraduate major in Foods and Nutrition or its equivalent with strong offerings in Organic, Biochemistry, Physiology, and Bacteriology. Students applying for graduate work in Home Economics Education should have an undergraduate major in Home Economics with some courses in Education and Practice Teaching. Graduate students interested in Child Development and Family Life may wish to avail themselves of the privilege of affiliation at Merrill-Palmer School in Detroit. Such students must take at least 15 credits in residence at the University.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

121. Developments in Nutrition Education.—Interpretation of changing and new concepts and of technical material; place of nutrition in schools and public health programs. Credit, 3.
Prerequisites, Home Economics 52 or 3 credits in physiological sciences.
Three class hours. Mrs. Cook and Miss Mitchell.

130. Home Management for Today's Families.—Emphasis on management principles involved in family economics, work simplification, and decision making in the home. For teachers, extension workers, and others who work in an advisery capacity with families. Credit, 2-3.
Prerequisites, B.S. degree in Home Economics, Home Economics 175 and 177, or equivalent, and professional experience.
Miss Merriam and Miss Strattner
(with Home Management Specialists and Research Staff in Family Finance).

200. Special Problem.—A special problem in the field of Home Economics. Recommended instead of a thesis for certain students. Credit, 3-6.
The Staff.

203. Advanced Nutrition—Metabolism of the Major Foodstuffs.—Energy metabolism and the metabolism of carbohydrates, fats, proteins, and related substances, their role in human nutrition, and physiological effects of dietary inadequacies. Special reports from current literature supplementing class discussion. Credit, 3.
Prerequisites, Biochemistry and/or Physiology. Miss Mitchell.

204. Advanced Nutrition—Vitamins and Minerals.—Vitamins and minerals in metabolism, their specific functions in the body and results of mild and severe deficiencies. Credit, 3.
Prerequisites, Biochemistry and/or Physiology. Mrs. Wertz.

205. Laboratory Methods and Techniques in Nutrition.—Several types of laboratory techniques that are currently used in nutrition research including fluorometric, colorimetric, spectrophotometric, and microbiological determinations of various nutrients in foods and biological fluids. Credit, 3.
One class hour; one 4-hour laboratory period.
Prerequisites, Chemistry 30, Home Economics 203 and 204 or equivalent.
Mrs. Wertz.

207. Problems in Nutrition.—Qualified students may work on a problem of special interest to them in the fields of vitamin and mineral metabolism, basal metabolism, dietary survey techniques, etc. Credit, 3.
Prerequisite, Home Economics 203, or 204 or equivalent. Mrs. Wertz.

210. Home Economics Seminar.—Readings, reports and discussions on the current literature of the following areas—family relations, family economics, and home management. Credit, 3.
Miss Merriam and Miss Strattner.

212. Nutrition Seminar.—Readings, discussions and preparation of bibliographies on nutrition problems of current interest. Credit, 1.
Miss Mitchell.

300. Thesis, Master's Degree.—Individual research in the field of nutrition. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

152. Nutrition and Dietetics.—The fundamentals of normal nutrition including energy needs, the metabolism of proteins, carbohydrates, fats, vitamins, and minerals, and the quantitative requirements for essential nutrients. Laboratory work on the composition of foods and their contribution to the diet.
Two class hours, one 2-hour laboratory period. Credit, 3.
Prerequisites, Home Economics 3 and 51, Chemistry 79 and Zoology 35.
Mrs. Cook.

170. Child Development.—The study of the whole child from the developmental point of view. Planned observation and participation in the Nursery School. Credit, 3.
Three class hours, one 1-hour laboratory period. Mrs. Thies.

175. Economics of the Household.—The family standards of living in the modern home, the economic relations of the household, and the use of time, energy, and money in the home situation. Credit, 3.
Prerequisite, Economics 25 or equivalent. Miss Merriam.

178. Advanced Textile Design.—Weaving and handling of complicated looms. Other types of textile design such as stenciling, silk screen printing, batik, block print, dependent on special student interests. Credit, 3.
One class hour, two 3-hour laboratory periods. Miss Briggs.
Prerequisite, Home Economics 26 or equivalent.
1958-59 and each alternate year.

181. Methods of Teaching Home Economics.—The philosophy of general education; the application of home economics to the entire school program; development of curricula based upon student needs; exploration of instructional methods and techniques. Gives credit toward meeting state standards for teachers. Credit, 3.
Miss Strattner.

185. Theory and Practice of Nursery School Management.—The philosophy and organization of the various activities and procedures of the Nursery School program including music, art, literature and science. Supervised participation in child development laboratory and field trips to observe special groups.
Two class hours, one 3-hour laboratory period. Credit, 3.
MRS. THIES.

186. Advanced Textiles.—An evaluation of the roles of newer fibers and finishes as they affect the appearance, performance, care and cost of apparel and household textiles. Designed for those interested in clothing, textiles and merchandising. Credit, 3.
Prerequisite, Home Economics 4. MISS HAWES.
Three class hours.
1959-60 and each alternate year.

187. Principles and Practices of Tailoring.—Emphasis on handling of wool in the tailoring of suits and coats. Credit, 3.
One class hour, one 4-hour laboratory period.
Prerequisite, Home Economics 35 or equivalent. ———.

188. Applied Dress Design.—Costume design through draping and pattern making. An intensive study of texture, line, color, and fit as applied to dress design and the figure. Credit, 3.
One class hour, two 2-hour laboratory periods.
Prerequisite, Home Economics 35 or equivalent. ———.

189. Diet Therapy.—The application of nutrition principles to diet in disease, including gastro-intestinal disorders, obesity, anemia, fevers, diabetes, food allergy, cardiovascular and biliary tract diseases. Students are required to be familiar with current medical literature as it applies to nutritional problems in disease. Credit, 3.
Prerequisites, Home Economics 52 or 203 and 204; Biochemistry; Physiology.
MRS. COOK.

190. Professional Seminars.—A one-credit seminar is offered in each of the five fields of subject matter: Nutrition, Textiles, Foods, Home Management and Equipment, Family Life and Child Development.

First Semester: Sections A. Child Development and Education (Strattner and Thies).
B. Home Management and Home Planning (Briggs and Merriam).
C. Textiles and Clothing (Hawes).
Second Semester: Sections D. Nutrition (Cook and Mitchell).
E. Foods, and Institution Management (Davis, Forbes, and McCullough).

Credit, 1-3.

191, 192. Institutional Administration and Quantity Food Preparation.—The principles of organization, personnel management, the administration, food costs, operating expenses, and special functions of the dietitian. Laboratory work at one of the university dining halls and field trips.
Credit, 4 each semester.
Prerequisites, Home Economics 51 and 52 or equivalent.
Two class hours, one 6-hour laboratory period. MRS. MCCULLOUGH.

193. Experimental Foods.—The testing and comparing of different food materials and methods of preparation, including advanced work in the science and techniques of cookery. Special individual problems. Credit, 3.
Two class hours, one 3-hour laboratory period.
Prerequisites, Home Economics 30 and 51; Chemistry 33 or equivalent; and permission of the instructor. MISS DAVIS.

HOME ECONOMICS

195. Child Nutrition.—The nutritional needs from prenatal life through school age. Methods of judging nutritional status; causes and effects of malnutrition. Work in the nursery school and with older children. Credit, 3.
Prerequisite, Home Economics 3, 52 or 54 or equivalent.
Three class hours. Laboratory by arrangement. MRS. COOK.

198. Problems in Home Economics.—An intensive study of some phase of home economics. Credit, 3.
By permission of the Dean of the School. THE STAFF.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agricultural Economics 203. Advanced Food Marketing. Credit, 3.
MR. FITZPATRICK.

Art 175. Art Appreciation. Credit, 3.
MR. NORTON.

Art 178. History of Art. Credit, 3.
MR. NORTON.

Bacteriology 202. Advanced Bacterial Physiology. Credit, 3-5.
MR. MANDEL.

Chemistry 193, 194. General Biochemistry. Credit, 4 each semester.
MR. LITTLE.

Chemistry 234. Advanced Biochemical Lectures. Credit, 3-5 each semester.
MR. LITTLE.

Chemistry 235. Biochemistry Laboratory Methods. Credit, 3.
MR. LITTLE.

Chemistry 237. Biocolloids. Credit, 3.
MR. BENNETT.

Chemistry 239. Chemistry of Natural Products. Credit, 2.
MR. LITTLE AND MR. WCWHORTER.

Economics 155. Economics of Consumption. Credit, 3.
MR. MORRIS.

Education 120. Construction of Audio-Visual Aids. Credit, 2-3.
MR. WYMAN.

Education 153. Educational Tests and Measurements. Credit, 2-3.
MR. ———.

Education 291. Educational Research. Credit, 2-3.
MR. PURVIS.

Food Technology 191, 192. Analysis of Food Products. Credit, 3 each semester.
MR. LIVINGSTON.

Food Technology 216. Food Packaging. Credit, 3.
MR. LEVINE.

Food Technology 221. Edible Fats and Oils. Credit, 2.
MR. ———.

Food Technology 241. Food Acceptance, Theory and Practice. Credit, 3.
MR. FAGERSON.

Psychology 193. Adolescent Psychology. Credit, 3.
MR. EPSTEIN.

Psychology 194. Child Psychology. Credit, 3.
Mr. ———.

Psychology 242. Psychology of the Pre-School Child. Credit, 3.
Mr. ———.

Sociology 157. The Family. Credit, 3.
Mr. King.

Zoology 183. General and Cellular Physiology. Credit, 4.
Mr. Swenson.

Zoology 187. Endocrinology. Credit, 3.
Mr. Snedecor.

Zoology 245. Advanced Vertebrate Physiology. Credit, 3.
Mr. Snedecor.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Home Economics)

163. Arts and Crafts.—Introduction to design and execution in crafts particularly adapted to work with children, and for any age in recreational leadership. Credit, 3.
Prerequisite, Home Economics 31 or equivalent. Miss Briggs.
One class hour, two 3-hour laboratory periods.

180. Family Life.—A study of the modern family; ideals and responsibilities of the home and the individual's share in developing positive family relationships. Credit, 3.
Mrs. Piatt.

HORTICULTURE

Arthur P. French, major adviser.

All students who major in this department are required to present a thesis as a part of their major requirements.

The graduate program consists of major programs of study in Floriculture, Olericulture and Pomology plus the following courses which are open to all students in horticulture.

Horticulture

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

211, 212. Seminar.—Each student will present papers on assigned topics in Horticulture. This course is required of all graduate students majoring in Floriculture, Olericulture, or Pomology. Credit, 1 each semester.
The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

162. Plant Breeding Methods.—An advanced study of genetic topics peculiar to plants together with consideration of the methods and problems of the plant breeder. Credit, 3.
Prerequisite, Zoology 153 or equivalent. Mr. French.

181. **Plant Cytological Techniques.**—The methods of cytology useful to the plant geneticist. Credit, 2.
Prerequisite, Botany 57. Mr. French.

182. **Special Problems in Plant Breeding.**—Advanced study of special topics in plant genetics and breeding. Credit, 2.
Prerequisite, Horticulture 162. Mr. French.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agronomy 263. Chemistry of the Soil. Credit, 5.
Mr. Steckel.

Agronomy 264. Experimental Methods in Agronomy. Credit, 3.
Mr. Yegian.

Botany 159, 160. The Angiosperms. Credit, 3-5 each semester.
Mr. Davis and Mr. Shuster.

Botany 161, 162. The Comparative Anatomy of Green Plants. Credit, 3 each semester.
Mr. Shuster.

Floriculture

Alfred W. Boicourt, major adviser.

Floriculture is a major program of study within the Department of Horticulture.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

201. **Floricultural Literature.**—A critical review of scientific literature in the field of floriculture. Topics selected according to the interests and needs of the individual student. Credit, 2 each semester.
Maximum credit, 4.
Mr. Boicourt and Staff.

203. **Advanced Systematic Floriculture.**—Taxonomic study of floricultural plants. This work to be undertaken in summer only. Credit, 3.
Prerequisites, Floriculture 181 and Botany 159, 160. Mr. Boicourt.

300. **Thesis, Master's Degree.** Credit, 10.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Floriculture)

151. **Greenhouse Management.** Credit, 3.
Mr. Boicourt and Mr. Goddard.

152. **Floral Arrangement.** Credit, 3.
Mr. Ross.

175, 176. **Commercial Floriculture.** Credit, 3 each semester.
Mr. Jester.

179. **Green Plants. 1960-61.** Credit, 2.
Mr. Goddard.

181. **Herbaceous Gardens and Borders.** Credit, 3.
Mr. Boicourt.

182. Seminar (Problem course). Credit, 3.
Mr. Boicourt.

Olericulture

GRANT B. SNYDER, major adviser.

Olericulture is a major program of study within the Department of Horticulture.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

201. Literature.—A critical study and analysis of selected scientific papers and reports of past and current research involving vegetable crops. Lectures and assigned readings. Credit, 3.
MR. TUTTLE.

276. Advanced Vegetable Plant Improvement.—Hybridization and selection as related to specific vegetable crops, with special attention to heterosis and its implications in vegetable breeding as well as sterility and its place in seed production of F1 hybrids. Credit, 3.
Prerequisites, Plant Breeding 152, Zoology 153 or equivalent. MR. LACHMAN.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

152. Commercial Culture.—The factors involved in the commercial culture of vegetable crops including soils, nutrition and the relationship of temperature, light and humidity to production techniques and practices both out of doors and in the greenhouse. Credit, 3.
Lectures and laboratory. MR. THOMSON.

173. Marketing and Storage of Vegetable Crops.—Evaluation of factors which may be involved in the market and storage handling of vegetables with particular emphasis on their relationship to quality and deterioration. Credit, 3.
MR. SNYDER.

174. Marketing Practices.—Practices, techniques and methods used in selling and distributing horticultural commodities through the various channels from the farm to the ultimate consumer. Credit, 3.
MR. SNYDER.

175. Systematic Olericulture.—Plant characteristics, nomenclature, identification and classification. Credit, 3.
1959-60. MR. SNYDER.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agronomy 263. Chemistry of the Soil. Credit, 5.
MR. STECKEL.

Agronomy 264. Experimental Methods in Agronomy. Credit, 3.
MR. YEGIAN.

Food Technology 216. Food Packaging. Credit, 3.
MR. LEVINE.

COURSE FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Olericulture)

151. Principles of Olericulture. Credit, 3.
Mr. Tuttle.

Pomology

Arthur P. French, major adviser.

Pomology is a major program of study within the Department of Horticulture.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

201, 202. Pomological Research.—A critical review of past and current research work in the field of pomology. Topics selected according to the interests and needs of the individual student. Credit, 2 each semester.
Prerequisites, Pomology 179 and 181. The Staff.

205. Advanced Systematic Pomology.—An intensive study of leaf and tree characters of nursery and orchard trees with reference to identification and the relationship of varieties. This work to be undertaken in the summer. Credit, 3.
Prerequisite, Pomology 175. Mr. French.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

179, 181. Advanced Pomology.—A consideration of the scientific principles governing the growth and behavior of fruit-bearing plants.
Prerequisite, Pomology 25 or equivalent. Credit, 3 each semester.
Mr. Southwick and Mr. Weeks.

184. Special Problems in Pomology.—Each student will investigate an individual problem and make reports thereon at the weekly class hour. Credit, 3.
Prerequisites, Pomology 179, 181 or equivalent. The Staff.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agronomy 263. Chemistry of the Soil. Credit, 5.
Mr. Steckel.

Agronomy 264. Experimental Methods. Credit, 3.
Mr. Yegian.

Botany 202, 203. Advanced Plant Physiology. Credit, 2-4 each semester.
Mr. Gentile.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Pomology)

156. Orchard Pest Control. Credit, 3.
Mr. Roberts.

175. Systematic Pomology. Credit, 4.
Mr. Anderson.

177. Commercial Pomology. Credit, 3.
Mr. Roberts.

LANDSCAPE ARCHITECTURE

Raymond H. Otto, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems.—Individual study by the B.L.A. candidate in lieu of a thesis; or exploratory work preliminary to the thesis by the M.L.A. candidate. Credit, 3.
The Staff.

290. Theory.—Special studies in the history and theory of landscape architecture and planning. Credit, 3.
Mr. Hamilton or Mr. Bacon.

291. Design.—Individual problems in any or all branches of public and private work. Credit, 3.
Mr. Otto.

292. Construction.—Road alignment, computations and advanced landscape construction. Credit, 3.
Mr. Procopio.

293. Presentation.—Studies in drafting, pen and crayon, rendering, water coloring, etc. Credit, 3.
Mr. MacIver.

294. Practice.—Professional field work under supervision, conducted upon going projects as opportunity offers. Credit, 3.
Mr. Blundell.

297. Architecture.—Selected problems. Credit, 3.
Mr. Kantianis.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

167. Architecture.—A survey of architectural development, including styles and forms in architecture, especially as affected by materials and methods of construction. Credit, 3.
Mr. Kantianis.

168. Architectural Design.—The relations between exterior and interior spaces and structures as a primary element in design and construction. A series of problems integrating theory, design analysis, and graphics. Credit, 4.
Mr. Spencer.

171. Planting Design.—The utilization of plant materials in combination as applied to the many conditions and demands of landscape work. Credit, 3.
Mr. Blundell.

173, 174. City Planning.—The historical and legal aspects of rural and urban land use and regional development, and a critical examination of planning techniques used in guiding the physical growth and arrangement of communities. Either semester may be elected independently.
Credit, 3 each semester.
Mr. Bacon.

LANDSCAPE ARCHITECTURE

175, 176. Projects in Planning.—An application of the principles of modern civic development through a series of problems on the design of various types of urban land areas. Credit, 3 each semester.
Mr. Bacon.

181, 182. Advanced Design.—Exchange problems plus specialized landscape details and a summary of design. Credit, 4 each semester.
Mr. Procopio.

184. Presentation.—Preparation and rendering of landscape and architectural plans, elevations, perspectives, etc. Credit, 2.
Mr. Kantianis.

192. Professional Practice.—Seminar on the methods and procedures of the professional office. Credit, 1.
Mr. Otto.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agronomy 153. Agrostology. Credit, 3.
Mr. Roberts.

Agronomy 156. Agrostology. Credit, 3.
Mr. Roberts.

Art 175. Art Appreciation. Credit, 3.
Mr. Norton.

Art 178. History of Art. Credit, 3.
Mr. Norton.

Botany 181. Plant Ecology. Credit, 3.
Mr. Livingston.

Floriculture 181. Herbaceous Gardens and Borders. Credit, 3.
Mr. Boicourt.

Philosophy 182. Aesthetics. Credit, 3.
Mr. Shute.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Landscape Architecture)

153. Applied Design.—A series of problems in the design of small home grounds and larger private properties. Credit, 4.
Mr. Otto.

154. Intermediate Design.—Special problems in site planning for semi-public and public works, institution grounds, etc. Credit, 4.
Mr. Blundell.

155. Construction Details.—A series of problems in architectural garden features as walks, steps, walls, fences, pools and small structures. Credit, 4.
Mr. Procopio.

FOR THE DEGREE OF BACHELOR OF LANDSCAPE ARCHITECTURE

To receive this professional bachelor's degree, each candidate will be required:

1. To have received the degree of Bachelor of Science or Bachelor of Arts from a recognized institution.

2. To have completed as a prerequisite 24 semester credits in landscape architecture, substantially equivalent to the technical courses now required in the undergraduate major in landscape architecture at this university.

3. In addition, to have completed in residence at this institution, 30 credits in landscape architecture and closely related subjects prescribed by the department. (See Fifth Year Program below.)

4. To have received the unanimous approval of the faculty of the department and the vote of approval of the faculty of the Graduate School.

FIFTH YEAR PROGRAM

The regular program of studies for the Fifth Year, subject to minor changes dependent upon courses taken previously, is as follows:

First Semester

201. General Design.—Class A Exchange problems and advanced local projects. Credit, 3.

Mr. Otto.

203. Ecology and Physiography.—Plant associations as related to ground forms and conditions. Credit, 3.

Mr. Blundell.

205. Architecture.—Studies in principles and problems of architectural design. Credit, 3.

Mr. Kantianis.

207. Contracts, Specifications, Estimating Costs.—Preparation of supporting data for proposed plans. Credit, 3.

Mr. Hamilton.

209. Landscape Sketching.—Graphic expression of suitable subjects in various media. Credit, 3.

Mr. MacIver.

Second Semester

202. General Design.—Continuation of 201. Credit, 3.

Mr. Otto.

204. Landscape Operations.—Supervision of local landscape projects. Credit, 3.

The Staff.

206. Architecture.—Studies in principles and problems of architectural design. Credit, 3.

Mr. Kantianis.

210. Architectural Sketching.—Graphic expression of suitable subjects in various media. Credit, 3.

Mr. MacIver.

Elective: Suitable subject assigned.

MATHEMATICS

ALLEN E. ANDERSEN, major adviser.

Special Departmental Entrance Requirements:

Candidates for admission who plan to major in this department must have completed at least eighteen semester credit hours in undergraduate mathematics beyond the content of Mathematics 29 and 30 (Differential and Integral Calculus), and also an undergraduate course equivalent to Physics 25 and 26 (Introductory).

Special Degree Requirements:

Six semester credit hours (undergraduate or graduate) in each of the fields of geometry, algebra and applied mathematics and twelve semester credit hours in the field of analysis. A minimum of twelve semester credit hours chosen from courses in this department which are numbered from 200 to 299.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Topics Course.—Topics may be chosen from the fields of algebra, geometry, theory of functions, topology, and applied mathematics.
Prerequisite, permission of instructor. Credit, 1, 2, or 3.
THE STAFF.

201, 202. Introduction to Modern Algebra.—Axiomatic foundation of algebra; groups, rings, fields and vector spaces; linear transformations and matrices.
Three class hours. Credit, 3 each semester.
Prerequisite, permission of instructor. THE STAFF.

221, 222. Theory of Functions of a Real Variable.—The real number system, limits, continuity and differentiability of functions of one and two real variables, theories of integration, sequences of functions. Credit, 3 each semester.
Three class hours. THE STAFF.
Prerequisite, Mathematics 191.

226. Theory of Functions of a Complex Variable.—The complex number system, elementary functions, line and contour integrals, expansion and representations of analytic functions, introduction to analytic continuation and Riemann surfaces. Credit, 3.
Three class hours. THE STAFF.
Prerequisite, Mathematics 221.

241. Topology I.—Point Set Topology: Set theory; Topological, Hausdorff and metric spaces; homeomorphisms; connectivity and compactness. Credit, 3.
Prerequisite, Mathematics 194. MISS CULLEN.

242. Topology II.—Combinatorial Topology: Simplexes, Complexes, Jordan's Theorem, Homology and Homotopy. Credit, 3.
Prerequisite, Mathematics 241. MISS CULLEN.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. Modern Synthetic Geometry.—Axiomatic Foundations of euclidean and noneuclidean geometries; extension of high-school geometry. Credit, 3.
Three class hours. MR. ROSE.
Prerequisite, Mathematics 30.

153, 154. Higher Algebra.—Permutations, Combinations, probability; mathematical induction, matrices, determinants, linear equations and dependence; quadratic forms and elimination theory; the complex number system; polynomial equations; elementary theory of groups, rings and fields. Credit, 3.
Prerequisite, Mathematics or permission of instructor. THE STAFF.

156. Finite Differences and Probability.—1959-60 and each alternate year.
Three class hours. Credit, 3.
Prerequisite, Mathematics 30. THE STAFF.

163. Statistics I.—The fundamental mathematical principles of statistical analysis. The derivation of the basic formulas used, and the study and discussion of such topics as averages, dispersion, skewness, curve fitting, least squares, linear and curvilinear correlation, probability and its application to statistics.
Three class hours. Credit, 3.
Prerequisite, Mathematics 29, previously or concurrently. MR. WAGNER.

164. Statistics II.—A continuation of Mathematics 163, including a study of the joint distribution of two or more random variables; the chi-squared, t-, and f-distributions and their applications; and techniques which do not involve an assumption about the form of the basic distribution. Credit, 3.
Three class hours. MR. WAGNER.
Prerequisites, Mathematics 163 and Mathematics 30, previously or concurrently.

166. Introduction to Higher Geometry.—Homogeneous point and line coordinates; infinite elements; harmonic division; groups of transformations and their invariants; and the elements of projective and other geometries will be considered. Credit, 3.
1959-60 and each alternate year. MR. ANDERSEN.
Prerequisite, Mathematics 30.

171. Vector Analysis.—The algebra and calculus of vectors. Applications to physics and other fields will be considered. Credit, 3.
1959-60 and each alternate year. THE STAFF.
Prerequisites, Mathematics 30, Physics 26.

172. History of Mathematics.—Classical problems and concepts of mathematics and the lives and times of the great mathematicians. Credit, 3.
1958-59 and each alternate year. MR. ROSE.
Three class hours.
Prerequisite, Mathematics 30.

174. Theory of Numbers.—Euclid's Algorism, Theory of Prime Numbers, Aliquot parts, congruences, further topics in Number Theory. Credit, 3.
1959-60 and each alternate year. THE STAFF.
Three class hours.
Prerequisite, Mathematics 30.

181. Differential Geometry.—Theory of the geometry of curves and surfaces in three dimensions. Credit, 3.
1959-60 and each alternate year. THE STAFF.
Three class hours.
Prerequisite, Mathematics 30.

183. Computational Methods.—Errors and approximations in computation, mehods of approximating roots of equations, approximation of functions, empirical curve fitting, approximate integration, and numerical integration of ordinary differential equations. Credit, 3.
1958-59 and each alternate year. MR. BOUTELLE.
Three class hours.
Prerequisite, Mathematics 30.

192. Differential Equations. Credit, 3.
Three class hours. The Staff.
Prerequisite, Mathematics 30.

193. Advanced Calculus.—The real number system, sequences, elementary theory of functions of one variable and of several variables, Riemann integral, line integrals, Green's theorem. Credit, 3.
Three class hours. The Staff.
Prerequisite, Mathematics 91.

194. Advanced Calculus.—Multiple integrals, improper integrals, gamma functions, Beta functions, elliptic functions, Fourier Series, Fourier Integral, Laplace Transforms. Credit, 3.
Three class hours. The Staff.
Prerequisite, Mathematics 193.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Mathematics)

155. Mathematics of Finance.—The mathematical principles of simple and compound interest, annuities, depreciation, valuation of bonds, insurance. The development and application of aids to computation in problems arising from financial transactions. Credit, 3.
Prerequisite, Mathematics 2 or 4. Mr. Boutelle.

160. Spherical Trigonometry and Solid Analytical Geometry.—The trigonometry of the sphere with applications to terrestrial and celestial problems; higher plane curves and the analytic representation of points, lines and surfaces in space. Credit, 3.
1959-60 and each alternate year. Mr. Boutelle.
Prerequisite, Mathematics 30.

191. Intermediate Calculus.—Series, expansion of functions, partial differentiation, envelopes and multiple integrals. Credit, 3.
Three class hours. The Staff.
Prerequisite, Mathematics 30.

MECHANICAL ENGINEERING

William H. Weaver, major adviser.

First Semester		*Second Semester*	
EE 201.	Engineering Analysis I. (3)	*EE 202.	Engineering Analysis II. (3)
ME 201.	Advanced Thermodynamics. (3)	ME 221.	Heat Transfer. (3)
ME 251.	Advanced Topics in Machine Design. (3)	**ME 241.	Advanced Dynamics. (3)
**ME 211.	Theory of Power Machines. (3)	ME 300.	Research and Thesis. (3-5)
ME 300.	Research and Thesis. (3-5)	***One free elective course subject to approval. This can be either a 100 or 200 series course, technical or non-technical.	

*Any other mathematics course open to graduate students only, may be substituted for this.

**Other approved courses may replace these courses, as for example 200 courses in Mathematics, Physics, Civil, Electrical, or Chemical Engineering.

***If the thesis is increased to fulfill the degree requirements of 30 credits, this course may be deleted.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in Mechanical Engineering.—Special investigational or research problems, the scope to be varied to meet specific conditions.
Prerequisite, as required by the problem. Credit, 1-6.
THE STAFF.

201. Advanced Thermodynamics.—The first and second laws, imperfect gases, combustion, and gas dynamics. Credit, 3.
Prerequisite, M.E. 87. THE STAFF.

211. Theory of Power Machines.—The thermodynamic and design aspects underlying power machinery such as gas and steam turbines, internal combustion engines, rotary and reciprocating compressors, jet propulsion and rockets.
Prerequisite, M.E. 201. Credit,3.
THE STAFF.

221. Advanced Heat Transfer.—Advanced topics in heat transfer.
Prerequisite, M.E. 182. Credit, 3.
THE STAFF.

241. Advanced Dynamics.—Vibration and stability of systems with many degrees of freedom, normal modes and frequencies; approximate methods. Nonlinear systems, self excited vibrations. Gyroscopic effects in mechanical systems. Selected topics with application to problems in engineering. Credit, 3.
Prerequisite, M.E. 185. MR. WHITE AND MR. SOBALA.

251. Advanced Topics in Machine Design.—Application of advanced theories of elasticity and strength of materials to machine design. Many other topics and considerable creative work are included. Credit, 3.
MR. BATES.

300. Thesis, Master's Degree. Credit, 3-10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

150. Fundamentals of Metallurgy.—Physical metallurgy involving crystal structure, solid solutions, diffusion in the solid state, freezing of metals, hardening of metals, annealing, and equilibrium diagrams. Fundamentals are applied to the study of the iron-iron carbide diagram, the S-curve, heat treatment of steel and the properties and uses of the other principal engineering metals. Laboratory work stresses metallographic technique.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisite, M.E. 35 or Chemistry 166. THE STAFF.

175. Steam Power Plants.—A study of steam power plants, including boilers, stokers, fuels, combustion, steam generation, prime movers, auxiliary equipment, and problems involved in design and operation. Credit, 3.
Prerequisite, M.E. 64. MR. SWENSON.

176. Refrigeration and Air Conditioning.—The fundamental principles of thermodynamics as applied to refrigeration and air conditioning. Application of refrigeration to industrial processes and the control of temperature, humidity and motion of air in buildings. Credit, 3.
Two class hours; one 3-hour laboratory period. MR. SWENSON.
Prerequisite, M.E. 64.

177. Internal Combustion Engines.—Study of gasoline and Diesel engines with emphasis on thermodynamic principles and actual operating characteristics. The gas turbine and jet propulsion engines are included. Credit, 3.
Prerequisite, M.E. 64. Mr. Dittfach.

183. Machine Design.—Principles involved in the design of various machine parts. Related topics included such as economy of manufacture, safety, styling, invention, and creativity. Credit, 3.
Two class hours; one 3-hour laboratory period.
Prerequisites, C.E. 53 and M.E. 68. Mr. Bates and Mr. Patterson.

185. Dynamics of Machinery.—Elements of vibration theory, vibration isolation, vibration analysis of equivalent masses and shaft systems. Vibration absorbers and dynamic balancing. Credit, 3.
Prerequisites, C.E. 52 and M.E. 68. Mr. Sobala.

186. Advanced Machine Design.—A continuation of Course 183. Additional elementary parts are analyzed, and some complete machines are studied. Considerable emphasis on invention and creativity. Credit, 3.
Two class hours; one 3-hour laboratory period.
Prerequisite, M.E. 183. Mr. Bates and Mr. Patterson.

190. Advanced Metallurgy.—Advanced topics in metallurgy including the structure of metals and recent metallurgical developments. Credit, 3.
Two class hours; one 3-hour laboratory period. The Staff.
Prerequisite, M.E. 150.

194. Experimental Mechanical Engineering. Credit, 3.
Prerequisite, permission of instructor. The Staff.

Industrial Engineering

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in Industrial Engineering.—Special investigational or research problems in industrial engineering, the scope to be varied to meet specific conditions. Credit, 1-6.
Prerequisite as required by the problem. The Staff.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

175. Job Evaluation.—The principles used to determine an evaluation of all occupations in order to establish an equitable rating between them, to establish sound wage and salary policies. Credit, 2.
Prerequisite, I.E. 51. The Staff.

176. Time Study.—The principles involved in the establishment of production standards and their application in the management functions of cost accounting, estimating, production control, incentives, budgetary control.
Two class hours; one 3-hour laboratory period. Credit, 3.
Prerequisites, I.E. 175, 182 concurrently except for Business Administration majors. The Staff.

177. **Production Control.**—The principles used to regulate production activities in keeping with the manufacturing plan. Credit, 3.
Prerequisite, I.E. 51. The Staff.

178. **Factory Planning and Lay-Out.**—The principles applying to the determination and development of the physical relationship between plant equipment and operators working toward the highest degree of economy and effectiveness in operation. Credit, 2.
One class hour; one 3-hour laboratory period. The Staff.
Prerequisites, M.E. 2 and I.E. 51.

180. **Plant Budgetary Control.**—The principles used to predetermine expenses for the factors of production and the comparison of results with the estimates to determine and deal with the causes of expense variations as applied by the operating organization in the industrial plant. Credit, 3.
Prerequisite, I.E. 51. The Staff.

182. **Work Simplification.**—The principles involved in the simplification of means of doing work and in the application and use of these principles.
One class hour; one 3-hour laboratory period. Credit, 2.
Prerequisites, M.E. 68 and I.E. 176 concurrently. The Staff.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Chemical Engineering 183. Survey of Nuclear Engineering. Credit, 3.
Mr. Marcus.

Civil Engineering 188. Advanced Stress Analysis. Credit, 3.
Mr. White.

Electrical Engineering 201, 202. Advanced Engineering Analysis I, II.
Credit, 3 each semester.
Mr. Roys and Staff.

PHILOSOPHY

Clarence Shute, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

266. **Philosophy of Education.**—An evaluation of various educational theories and practices viewed in the light of historical perspective and contemporary thought. Credit, 3.
Mr. ———.

271. **Social Philosophy.**—Starting with an analysis of the present world situation, attention will be given to conflicting claims regarding the basis on which social orders are to be criticized. An attempt will be made to formulate a philosophical foundation for democratic society. Credit, 3.
Mr. ———.

289, 290. **Seminar.**—Conferences and reports on special studies in philosophy. Credit, 1-3.
The Staff.

300. **Thesis, Master's Degree.** Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. **History of Philosophy.—Ancient and Medieval.**—The development of western thought with emphasis on the cultural factors which generated and interacted with the successive philosophical interpretations of man's experience.

Credit, 2-3.
MR. SHUTE.

152. **History of Philosophy.—Modern.**—The impact of modern science on the development of man's comprehensive understanding of the world, of the powers and limitations of knowledge, and of the basis of his valuations.

Credit, 2-3.
MR. SHUTE.

153. **The Philosophy of Plato.**—The later dialogues are read for their analysis of the major philosophical problems in ethics, politics, science, religion, metaphysics, and epistemology. Attention to the influence of Plato's philosophy in the development of certain 20th century philosophies. Alternates with Philosophy 155. Credit, 2-3.

Prerequisite, Philosophy 25 or 151. MR. SHUTE.

155. **The Philosophy of Aristotle.**—Selections from the works of Aristotle are studied with a view to increased understanding both of the formulation which Aristotle gave to leading categories of thought in natural science, ethics, aesthetics, psychology, metaphysics, and epistemology, and of Aristotle's systematic theory in these fields. Credit, 2-3.

Prerequisite, Philosophy 25 or 151. MR. SHUTE.

158. **Philosophy in the Age of Enlightenment.**—Representative thinkers of Cartesian and British empiricist traditions; the relation between the Kantian approach to metaphysics and epistemology and those which characterize these traditions; the impact of the rise of modern science on the development of philosophy during this age. Credit, 2-3.

Prerequisites, either Philosophy 25 and permission of instructor, or Philosophy 152. MR. EHRLICH.

161. **Contemporary Philosophies.**—A survey of present-day American and European thinking as exemplified by the great diversity of problems, methods, and perspectives. Naturalism, Idealism, Realism, Existentialism, Pragmatism, Positivism. Credit, 2-3.

Prerequisites, either Philosophy 25 and permission of instructor, or Philosophy 152 or 158. MR. EHRLICH.

164. **Existential Philosophies.**—The main problems peculiar to this movement as a whole and to its main exponents individually (i.e., Nietzsche, Kierkegaard, Jaspers, Heidegger, Sartre, Marcel). Selections from at least three of the named thinkers will be read; the philosophical background and the significance of the existential philosophies will be considered. Credit, 3.

Prerequisites, either Philosophy 25 and permission of instructor, or Philosophy 151 or 152. MR. EHRLICH.

167. American Pragmatism.—The characteristically American reinterpretations of the main strands of Western thought and of uniquely American contributions to philosophy; the sources of pragmatism in New England thought and in the American experience; the work of William James and John Dewey. Prerequisite, Philosophy 25 or 151 or 152. Credit, 2-3.
Mr. ———.

168. Oriental Philosophies.—The present conflict in ideologies within and between the leading cultures of Asia, understood in the light of their philosophical history; the bearing of philosophical differences between East and West on the problem of mutual understanding. Credit, 2-3.
Mr. Shute.

172. Philosophy of Science.—The backgrounds, presuppositions, methods and general theories of modern physical, biological, and social sciences. Credit, 2-3.
Mr. ———.

175. Symbolic Logic.—Modern analytic, symbolically formalized treatment of deductive inference and its important problems, i.e., quantification, the logic of classes, relations and functions, consistency and the logical paradoxes. The application of this method to systematization in science, mathematics, and philosophy and to the problem of induction. Credit, 2-3.
Mr. Swanson.

181. Philosophy of Religion.—The contrasting types of religious philosophy in the contemporary Western world and Asia, with a critical and constructive study of basic issues, such as the meaning of knowledge in the field of religion, the nature of faith, and the religious interpretation of reality. Credit, 2-3.
Mr. Shute.

182. Aesthetics.—The leading modern theories of the nature of art, the analysis of aesthetic experience, the distinctive function of art in culture and personality, and the principles of criticism. Credit, 2-3.
Mr. Shute.

185. Metaphysics.—The field of metaphysics defined in distinction from the field of science; contrasting theories of reality offered by contemporary naturalism and idealism, especially in the light of recent developments in biological and physical science; analysis of basic ideas which will enable the students to continue a fruitful development of his own philosophy. Credit, 2-3.
Mr. Swanson.

186. Theory of Knowledge.—Types of knowledge and correlated methods of knowing; questions of certainty, probability, and limits of knowledge; ways of expression, such as mathematical formulae, language, and art, and their involvement in the knowing process; the nature of the relation between the knowing subject and the known object. Credit, 2-3.
Mr. Ehrlich.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Government 171. Ancient and Medieval Political Thought. Credit, 3.
Mr. Tinder.

Government 172. Modern Political Thought. Credit, 3.
Mr. Tinder.

PHYSICAL EDUCATION FOR MEN

COURSES FOR MINOR CREDIT ONLY

In addition to the standard requirements of the courses, graduate students must work on a special project requiring research with a resultant term paper.

154. (II) Physical Education in Secondary Schools.—Modern methods of teaching physical education in secondary schools. Objectives, content material, and organization procedures. Credit, 3.
Mr. Bischoff.

155. (I) Organization and Administration of Physical Education.—Problems and procedures in physical education, organization of programs, classification of students, equipment, finance, construction and maintenance of gymnasia, swimming pools, and outdoor play areas. Credit, 3.
Mr. Kauffman.

156. (II) Adaptive Physical Education.—A program of developmental activities, games, sports, and rhythms suited to the interests, capacities and limitations of the atypical individual. Credit, 3.
Prerequisite, Physical Education 42. Mr. Garber.

176. (I) Philosophy and Principles of Physical Education.—Contemporary interpretations and critical analysis. Compilation and organization of material in a functional relationship for the foundation of policies and program construction. Credit, 3.
Mr. Kauffman.

178. (II) Physiology of Exercise.—Application of basic physiological concepts to the program of physical education, emphasis upon the physiological effects and adjustments accruing from participation in physical activity. Credit, 3.
Prerequisite, Physical Education 42. Mr. Bosco.

180. (II) Driver Education Instructor Course.—Driver education and driver training at the instructor's level. Leads to certification as instructor in driver education and driver training. Credit, 2.
Mr. Briggs.

187. (I) Physical Education in Elementary Schools.—Aims and objectives, modern materials and methods of teaching physical education at the elementary level. Credit, 3.
Mr. Footrick.

PHYSICS

J. D. Trimmer, major adviser.

Candidates planning to major in Physics should have completed at least fifteen semester credit hours in undergraduate physics beyond an introductory course (such as Physics 25 and 26), and also six credits of mathematics beyond the calculus.

Requirements for the Master's Degree include six credits of work devoted to thesis.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

201, 202. Theoretical Physics.—Topics in theoretical physics, with emphasis on classical mechanics (methods of Lagrange, Hamilton, and Jacobi) and on electromagnetic fields in continuous media. Credit, 3 each semester.
Prerequisites, Physics 52 or 56 and Mathematics 91 and 92. Mr. Rosen.

211. Elements of Quantum Theory.—The elements of wave mechanics, matrix mechanics, and transformation theory. Credit, 3.
Prerequisite, Physics 201. Mr. Rosen.

212. Theoretical Nuclear Physics.—Application of quantum theory to topics in nuclear physics. Credit, 3.
Prerequisite, Physics 211. Mr. ———.

300. Thesis, Master's Degree. Credit, 6.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

166. Kinetic Theory.—Classical kinetic theory of gases, with an introduction to phenomena in the non-uniform gas. Credit, 3.
Prerequisite, Physics 55. Mr. Foland.

167. Statistical Mechanics and Information Theory.—A study of the concepts of entropy, information, and order. Credit, 3.
Prerequisite, Physics 61. Mr. Trimmer.

185, 186. Modern Physics.—Lectures and problems on Twentieth-century physics, the first semester devoted principally to atomic aspects, the second to nuclear. Credit, 3 each semester.
Prerequisites, Physics 52 and six other credits in junior-senior physics.
The Staff.

188. Solid State Physics.—An introduction to theoretical and experimental physics of the solid state. Credit, 3.
Prerequisite, Physics 185. Mr. ———.

COURSES FOR MINOR CREDIT ONLY
(No graduate credit for students majoring in Physics)

151, 152. Electricity and Magnetism.—Course 151 deals largely with direct currents; Course 152 with alternating currents, applications of thermionics, and photo-electricity. Credit, 3 each semester.
Two class hours; one 2-hour laboratory period. Mr. Jones.
Prerequisites, Physics 26 and Math. 29.

155, 156. Mechanics.—Development of the fundamental concepts of classical dynamics with applications to particles and rigid bodies in translation and rotation. Credit, 3 each semester.
Three class hours. Mr. Foland.
Prerequisites, Physics 26 and Math. 30.

160. Sound and Acoustics.—A study of the vibrations, vibrating bodies, coupled systems, sound structure, and acoustic properties. Credit, 3.
Two class hours; one 2-hour laboratory period. Mr. Trimmer.
Prerequisite, Physics 155 or equivalent.

161, 162. Heat and Thermodynamics.—A study of heat exchanges and energy changes due to heat in systems of matter. Credit, 3 each semester.
Two class hours; one 2-hour laboratory period. Mr. Richardson.

163, 164. Optics.—An intermediate course in the theory of light. Geometrical and physical optics. Credit, 3 each semester.
Two class hours; one 2-hour laboratory period. Miss Lewis.

175, 176. **Advanced Experimental Work in Selected Topics.**—These courses are largely experimental and the subject matter is adapted to the needs of the individual student. Credit, 3 each semester.
One class hour; two 2-hour laboratory periods. The Staff.
Prerequisites, Physics 151, 152 or 155, 156 or 163, 164 and Math. 29 and 30.

195, 196. **Electronics.**—Two class hours; one 2-hour laboratory period.
Prerequisites, Physics 151, 152; Math. 29 and 30. Credit, 3 each semester.
Mr. Trimmer.

POULTRY SCIENCE

Thomas W. Fox, major adviser.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. **Special Problems.**—Research problems or critical literature review in avian genetics, physiology or nutrition not related to the candidate's thesis.
Credit, 1-6.
The Staff.

205. **Avian Genetics.**—Lectures covering the genetics of the principal domesticated birds and the physiology of reproduction of avian species. Credit, 3.
Prerequisites, at least one year's training in biology and Zoology 153 or its equivalent. Mr. Smyth.

206. **Advanced Poultry Genetics.**—The principles of population genetics and the problems of quantitative inheritance as they apply to selection for economic traits in poultry; theoretical and practical considerations of breeding systems.
Prerequisites, Poultry 205, Zoology 153, Poultry 177 or equivalent. Credit, 3.
Mr. Fox.

207. **Advanced Poultry Nutrition.**—Lectures and reports on research methods and designs for poultry nutrition experiments; discussion of current research developments and theories. Credit, 3.
Prerequisites, Chemistry 151, 152, and 179, and Poultry 173 or its equivalent.
Mr. Anderson.

208. **Advanced Poultry Physiology.**—Lectures and reports on specific problems in avian physiology. Credit, 3.
Prerequisites, Chemistry 179 and one year of biology. Mr. Mellen.

250, 251. **Seminar.—Review of Current Literature.** Credit, 1 each semester.
Maximum credit, 4.
The Staff.

300. **Thesis, Master's Degree.** Credit, 10.

400. **Thesis, Ph.D. Degree.** Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For minor credit only)
(No graduate credit for students majoring in Poultry Science)

163. **Poultry Biology.**—The specific biological attributes of the domestic fowl, with emphasis on anatomy and physiology of the digestive, reproductive and endocrine systems and specific physiological responses to environmental influences. Credit, 3.
Mr. Mellen.

173. Poultry Nutrition.—The scientific principles of nutrition, nutritive classification of feedstuffs, formulation and calculation of rations for specific purposes. Credit, 3.
Mr. Anderson.

177. Poultry Breeding.—The improvement of poultry by selection using the principles of heredity. The inheritance of morphological and physiological characters including plumage color, egg production, meat production, hatchability, egg traits and disease resistance. Credit, 3.
Mr. Fox.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Agronomy 264. Experimental Methods in Agronomy. Credit, 3.
Mr. Yegian.

Animal Husbandry 205. Advanced Animal Nutrition. Credit, 3.
Mr. Archibald and Mr. Elliot.

Animal Husbandry 211. Advanced Animal Genetics. Credit, 3.
Mr. Gaunt and Mr. Black.

Animal Husbandry 216. Fertility and Fecundity. Credit, 3.
Mr. Black.

Animal Husbandry 226. The Histology of Domestic Animals. Credit, 3.
Mr. Greenstein.

Bacteriology 202. Advanced Bacterial Physiology. Credit, 3-5.
Mr. Mandel.

Chemistry 182. Qualitative Organic Chemistry. Credit, 4.
Mr. Cannon.

Chemistry 193, 194. General Biochemistry. Credit, 4 each semester.
Mr. Little.

Chemistry 234. Advanced Biochemical Lectures. Credit, 3.
Mr. Little.

Chemistry 235. Biochemical Laboratory Methods. Credit, 3-5.
Mr. Little.

Chemistry 236. Advanced Biochemical Analysis. Credit, 3-5.
Mr. Little.

Chemistry 237. Biocolloids. Credit, 3.
Mr. Bennett.

Chemistry 239. Chemistry of Natural Products. Credit, 2.
Mr. Little and Mr. McWhorter.

Home Economics 203. Advanced Nutrition.—Metabolism of the major foodstuffs. Credit, 3.
Miss Mitchell.

Home Economics 204. Advanced Nutrition.—Vitamins and Minerals. Credit, 3.
Mrs. Wertz.

Home Economics 205. Laboratory Methods and Techniques in Nutrition. Credit, 3.
Mrs. Wertz.

Home Economics 212.	Nutrition Seminar.	Credit, 1. Miss Mitchell.
Zoology 178.	Genetics of Animal Populations.	Credit, 2. Mr. Rauch.
Zoology 183.	General and Cellular Physiology.	Credit, 4. Mr. Swenson.
Zoology 184.	Comparative Physiology.	Credit, 4. Mr. Roberts.
Zoology 187.	Endocrinology.	Credit, 3. Mr. Snedecor.
Zoology 220.	Experimental Embryology.	Credit, 3. Mr. Woodside.
Zoology 245.	Advanced Vertebrate Physiology.	Credit, 3. Mr. Snedecor.
Zoology 248.	Physiological Genetics.	Credit, 3. Mr. Rauch.
Zoology 255.	Zoology Seminar.	Credit, 1. The Staff.
Zoology 260.	Physiology Seminar.	Credit, 1. Mr. Swenson.
Zoology 273.	General Cytology.	Credit, 3. Mr. Rollason.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For minor credit only)
(No graduate credit for students majoring in Poultry Science)

135. **Advanced Poultry Husbandry.**—A critical review of research in any one of these fields: (a) genetics and physiology, (b) nutrition, (c) marketing, or (d) incubation and brooding. Three written reports and a comprehensive final examination are required. Designed for teachers of vocational agriculture.
Credit, 3.
Prerequisites, are standard undergraduate courses in poultry husbandry.
The Staff.

PSYCHOLOGY

Claude C. Neet, major adviser.

The graduate student majoring in Psychology may orient his program toward either the Doctor of Philosophy degree or the Master's degree. Major emphases may be in the areas of clinical and general experimental psychology. Programs of study leading to the Ph.D. are also available in the following areas: child counseling, industrial psychology, school and social psychology.

Students taking the doctorate must satisfy the general requirements of the Graduate School for the degree. They must also include in their programs of study the following psychology courses: 175, 207, 213, 226, 295, 296, and 400. In addition they must elect four of the following courses: 163, 172, 202, 203, 204, 206, and 210. The doctorate program provides practicum courses in each of the applied specialization areas. Institutions and agencies available for such field work include Belchertown State Hospital, Clarke School for the Deaf, Holyoke

Mental Health Clinic, Northampton State Hospital, Northampton V.A. Hospital, Springfield Child Guidance Clinic, University Guidance and Counseling Services, University Nursery School, Worcester State Hospital, Worcester Youth Guidance Center, and various industrial concerns in nearby towns.

All students qualifying for the Master of Science degree in Psychology must, in addition to meeting the degree requirements of the Graduate School, take course 175 and either 200 or 300. They must also pass a written examination which will cover certain general fields of psychology selected by the Department and certain special fields which may be chosen by the candidate. A final oral examination, given by the problem or thesis committee and the Department, is required. Credits taken to satisfy the requirements for the Master's degree can be applied to the total number of credits required for the doctorate.

Students applying for admission for either the Doctor's or Master's degree program, in addition to meeting the requirements of the Graduate School, should have taken an Introductory course and 21 additional undergraduate credits in Psychology, including a course in laboratory experimental psychology, or the equivalent, and a course in Statistics. In case the student has not taken this number of credits or lacks these courses, he may be allowed to make up the deficiencies in the Undergraduate School of the University. In exceptional cases, students with entrance deficiencies may, at the end of one semester's study, petition the Department to waive remaining undergraduate deficiencies.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Problem in Psychology.—A research project which may be taken in lieu of the master's thesis, or by doctoral students as minor research. Credit, 4-6.
THE STAFF.

202. Neural Correlates of Behavior.—The neuroanatomy of sensory-motor systems with emphasis on the major fiber systems and their role in behavior. 1958-59 and each alternate year. Credit, 3.
Prerequisites, 6 credits Psychology and 6 credits Zoology or the equivalent.
MR. FELDMAN.

203. Learning I.—The basic laws of learning, and relevant research techniques. Credit, 3.
1959-60 and each alternate year. MR. GOSS.

204. Learning II.—The implications of the basic laws of learning for explaining complex behavior. Credit, 3.
1959-60 and each alternate year. MR. GOSS.
Prerequisite, Psychology 203.

206. Discriminal Processes.—Sensory and perceptual processes; the relationships among physical, physiological and behavioral variables. Credit, 3.
1959-60 and each alternate year. MR. FELDMAN.
Prerequisites, 6 hours Psychology and 3 hours Zoology or the equivalent.

207. Systematic Psychology.—The general structure of psychological theory, and an historical and comparative consideration of the backgrounds, viewpoints on scientific methodology, research interests and techniques, and the component variables, hypotheses, and laws of structural, Gestalt, functional, and behavioristic movements. Credit, 3.
1958-59 and each alternate year. MR. GOSS.

210. Emotion and Motivation.—The nature, determinants, and interrelationships of emotion and motivation; the techniques involved in investigating these phenomena. Credit, 3.
1958-59 and each alternate year. MR. NEET.

213. **Test Construction I.**—Theory and practice of the construction and analysis of tests; correlation procedures; reliability; validity; item analysis; test weights; introduction to factor analysis techniques. Credit, 3.
Prerequisite, Psychology 175, previously or concurrently. Mr. Myers.

214. **Test Construction II.**—Measurement theory; psychophysical methods; construction, analysis, and comparison of various attitude scales. Credit, 3.
1958-59 and each alternate year. Mr. Myers.
Prerequisite, Psychology 213.

216. **Advanced Applied Statistics.**—Various experimental designs, the assumptions underlying their use, and the appropriate statistical analyses; orthogonal and randomized designs, trend analysis, non-parametric techniques, and multivariate analysis. Credit, 3.
Prerequisite, Psychology 175 or its equivalent. Mr. Myers.

221. **Advanced Social Psychology.**—Experimental study of determinants of social interaction, effect of needs and motives on perception, opinion and attitude measurement, determinants of attitudes, and propaganda. Credit, 3.
Two class hours; one 2-hour laboratory period. Mr. Lewit.
Prerequisite, Psychology 161 or 162.

226. **Theories of Personality.**—Problems and sources of data relating to the study of personality. An evaluation of the contributions of psychological theories, and an approach to an integrated theory. Credit, 3.
1958-59 and each alternate year. Mr. Lewit.
Prerequisite, Psychology 207.

235. **Advanced Abnormal Psychology.**—Behavior disorders and their relationships to normal behavior, with major emphasis on theories of etiology and symptom formation, and on general problems of therapy. Credit, 3.
Prerequisite, Psychology 183, or the consent of the instructor. Mr. Neet.

242. **Psychology of the Pre-School Child.**—The behavior of the child from the early prenatal period to the school age. Credit, 3.
Prerequisite, Psychology 194, or the consent of the instructor. Mr. ———.

245. **The Psychology of Exceptional Children.**—The etiology, diagnosis, and treatment of exceptional children, with special emphasis on intellectual, social, physical and sensory deviations. Credit, 3.
Prerequisites, Psychology 82 or 182, 83 or 235, 94 or 194. Students having only two of these three prerequisites may take the course on consent of the instructor.
Mr. ———.

246. **Diagnosis and Treatment of Behavior Disorders in Children.**—The diagnosis and treatment of psychological maladjustments in infancy and childhood; treatment procedures, resources, and methods used in dealing with behavior and personality problems. Lectures, discussions and case demonstrations.
Prerequisites, Psychology 182, 183 or 235, 194 or 242, 252 and 253. Credit, 3.
Mr. Kates.

252. **Diagnostic Methods I.**—The methods of administration and of the scoring procedures of a variety of diagnostic methods with emphasis on the Rorschach and Thematic Apperception Test. Credit, 3.
Prerequisite, Psychology 182. Mr. Epstein.

253. **Diagnostic Methods II.**—Basic interpretive procedures of diagnostic devices with emphasis on the Rorschach and Thematic Apperception Test.
Prerequisite, Psychology 252. Credit, 3.
Mr. Epstein.

255. Psychotherapy I.—Analyses of techniques of individual psychotherapy. The student may elect concurrently a practicum in psychotherapy in which a therapy case, under supervision, will be carried in one of the following facilities: child guidance clinic, student counseling center, mental hospital. Credit, 3.
Prerequisites, Psychology 226, 235, 252, 253 and 254. Mr. Kates.

256. Psychotherapy II.—Analyses of group and specialized techniques of psychotherapy. The student will elect concurrently a practicum in which supervised practice in one or more group psychotherapeutic methods will be given.
Prerequisites, Psychology 226, 235, 252, 253, 254 and 255. Credit, 3.
Mr. Kates.

257, 258. Seminar.—Selected topics of current significance in psychology. Research studies will be analyzed and theoretical advances explored.
Either semester may be elected independently. Both may be taken only with change in topic. Credit, 2 each semester.
Prerequisite, permission of instructor. Maximum credit, 6.
The Staff.

265. Counseling and Interviewing Techniques.—Current counseling and guidance techniques employed with groups and individuals, including the organization of counseling services and the use of occupational information and referral sources. Credit, 3.
Prerequisites, Psychology 181 and 182. Mr. Field.

271. Advanced Industrial Psychology I.—Human factors in work and performance; interrelationships of motivational and perceptual phenomena to the working environment. Credit, 3.
Prerequisite, Psychology 186 or permission of instructor. Mr. Teichner.

272. Advanced Industrial Psychology.—The theory and principles of man-machine-environment systems, with special attention to description, analysis, and synthesis in terms of information theory, servo analogues, psychophysiological effects, and operations research. Operations research will be considered only as it applies to the context of industrial psychology. Credit, 3.
Prerequisites, Psychology 186 and 271. Mr. Teichner.

283, 284. Practicum.—Practice in the application of psychological techniques to the following areas of psychology: child, clinical, guidance and counseling, industrial, and social. Either semester may be elected independently.
Total credit, 3-12.
The Staff, with the Staffs of cooperating institutions and agencies.

295, 296. Research Methodology.—A study and evaluation of research methods and of problems in the major fields of psychology. Two semesters are required of students studying toward the doctorate. Credit, 2 each semester.
The Staff.

300. Thesis, Master's Degree. Credit, 8-10.

400. Thesis, Ph.D. Degree. Credit, 30.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

161. Social Psychology.—The social behavior of the individual; methods of studying social behavior; "schools" of social psychology; social behavior of animals; foundations of personality development; social (cultural) determinants of personality; social attitudes and their measurement; effects of collective situations on individual behavior; customs and conformity. Credit, 3.
Prerequisite, Psychology 26. Mr. Lewit.

162. Social Psychology.—Multiindividual phenomena methods of studying collective action, leadership, morale, propaganda, nature and measurement of public opinion, behavior in crowd situation, social conflict and prejudice.
Prerequisite, Psychology 161 or the consent of the instructor. Credit, 3.
Mr. Lewit.

163. Physiological Psychology.—The relationships between the individual's behavior and his physiological processes, with emphasis on sensory and motor phenomena, drives, emotional behavior, and learning. Credit, 3.
Prerequisites, 6 units of Psychology; Zoology 35. Mr. Feldman.

172. Advanced Experimental Psychology.—Experimental design, techniques, and apparatus in psychology. Selected projects are carried out individually by the members of the class. Credit, 3.
1959-60 and each alternate year. Mr. Neet.
Prerequisites, Psychology 51, and Zoology 35.

175. Psychological Statistics.—The application of statistical procedures to the analysis of psychological data and to problems of measurement in psychology and related fields. Credit, 3.
Prerequisite, one semester of statistics, or the equivalent. Mr. Myers.

181. Psychological Tests.—The construction, development, and use of a variety of psychological tests, with emphasis on the administration, scoring, interpretation and evaluation of tests of personality, interests, aptitudes, and group tests of intelligence. Credit, 3.
Prerequisite, Psychology 26. Mr. Miller.

182. Psychological Tests, Individual Intelligence Tests.—Theories as to the nature and measurement of intelligence, with emphasis on the administration, scoring and interpretation of individual intelligence tests such as the Stanford-Binet, Wechsler-Bellevue, Merrill-Palmer, and others. Credit, 3.
Prerequisite, Psychology 26. Mr. Miller.

186. Industrial Psychology.—Psychological principles and methods in business and industrial situations; employee selection and training; motivation and morale; working conditions; fatigue and accident prevention. Credit, 3.
Prerequisite, Psychology 26. Mr. Teichner.

193. Adolescent Psychology.—The application of the basic principles of learning, primary and secondary motivation, frustration and conflict to the facts and problems of adolescent behavior. Credit, 3.
Prerequisite, Psychology 26. Mr. ———.

COURSES FOR MINOR CREDIT ONLY

(No graduate credit for students majoring in Psychology)

151. Sensory and Motivational Processes.—The data, theories and methods of investigation of sensory, perceptual, emotional and motivational processes.
Two class hours; one 3-hour laboratory. Credit, 3.
Prerequisite, Psychology 26. Mr. Neet.

152. Learning and Thinking.—The effects of practice and conditions of practice on acquisition, generalization, discrimination, transfer, retention and extinction processes in situations ranging from Pavlovian conditioning to problem solving. Credit, 3.
Two class hours; one 3-hour laboratory. Mr. Goss.
Prerequisite, Psychology 26.

156. **Educational Psychology.**—Psychological facts and principles fundamental to education, teaching, and personal relationships between teacher and pupil; physical and mental growth; intelligence; motivation; emotions; learning; transfer of training; mental hygiene of teacher and pupil. Credit, 3.
Prerequisite, Psychology 26. Mr. Miller.

179. **Personality.**—Historical and contemporary conceptions of personality; constitutional foundations of personality; psychodynamic development of the self; perceptual and cognitive approaches to personality; the effect of social-cultural conditions upon behavior; personality types and traits; expressive aspects of behavior; the concept of personality maturity. Credit, 3.
Prerequisite, Psychology 26. Mr. Kates and Mr. Lewit.

183. **Abnormal Psychology.**—Dynamics of behavior abnormalities: the neuroses, psychoses, mental deficiency, speech problems, and sensory and motor disorders. Credit, 3.
Prerequisite, Psychology 26. Mr. Kates.

188. **Psychology of Guidance.**—The psychological principles, techniques and tests necessary in guidance. Practice in organizing and evaluating relevant data in the analysis of illustrative cases. Credit, 3.
Prerequisite, Psychology 181. Mr. Field.

190. **Contemporary Psychologies.**—An introductory historical, logical and systematic analysis of contemporary psychological theories. Credit, 3.
Prerequisite, Psychology 26. Mr. Goss.

192. **Clinical Psychology.**—The development, and present status of the techniques and methods used by the psychologist in the diagnosis and treatment of behavior disorders; the use of diagnostic tests; psycho-therapy: the general role of the clinical psychologist. Credit, 3.
Prerequisite, Psychology 183. Mr. Epstein.

194. **Child Psychology.**—Psychological aspects of original nature, maturation, play, social behavior, personality and mental hygiene. Nursery school observation and practice. Credit, 3.
Prerequisite, Psychology 26. Mr. ———.

195. **Introduction to the Study of Exceptional Children.**—The behavior and adjustment of different groups of exceptional children and the problems faced in working with these groups, with emphasis on the incidence, diagnosis, etiology and prognosis of deviations in mental, physical, socio-emotional and educational development. Credit, 3.
Prerequisite, Psychology 194 or permission of instructor. Mr. ———.

PUBLIC HEALTH

Ralph L. France, major adviser.

The following courses are offered to students interested in environmental sanitation who intend to prepare for positions as industrial and public health sanitarians. With the cooperation of the Massachusetts Department of Public Health and the New England Field Training Center conducted by the United States Public Health Service, field training is integrated into the curriculum. Applicants must have satisfied the entrance requirements of the Graduate School and should have completed an undergraduate major in physical or biological sciences. Experience as a full-time employee in environmental sanitation may be accepted in lieu of specific undergraduate requirements.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in Public Health.—Special investigational or research problems in public health for advanced students. The scope of the work can be varied to meet specific conditions. Credit, 3-6.
THE STAFF.

201. Public Health Law.—The uses and limitations of law in disease control. Individual work includes studies of court decisions and the preparation of administrative regulations. Credit, 3.
MR. WISNIESKI.

202. Methods of Public Health Education.—The classical health education efforts that have favorably influenced community health. Individual work involves the preparation of pamphlets and exhibits, setting up demonstrations, and arranging short courses for adult groups. Credit, 3.
MR. WISNIESKI.

203. The Planning of Environmental Sanitation Programs.—Principles of environmental sanitation are translated into community programs planned to meet attainable objectives. Sanitary surveys and rating systems are studied as measuring devices for the practical effect of programs. Credit, 3.
MR. WISNIESKI.

206. Advanced Epidemiology.—Lectures and discussions on the principles and methods of epidemiological investigation, with laboratory work in assembling and analyzing crude data resulting from field investigations of epidemics. Prerequisite, Public Health 188 or equivalent. Credit, 3.
THE STAFF.

207. Seminar.—Lectures and reports on current literature and special topics. (One credit each semester.) Credit, 1-2.
THE STAFF.

300. Thesis, Master's Degree.—Independent research leading to the preparation of a thesis that will make an original contribution to public health literature. Results should be suitable for publication. The thesis is optional for M.S. candidates who have had sufficient training in public health before entering graduate school to profit more from thesis research than from additional courses.
Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

161, 162. General and Community Sanitation.—The problems of general and community sanitation, including insect and rodent control, housing, slum clearance, ventilation, lighting, bathing places, eating and drinking utensils, nuisances, industrial hygiene, water supplies, sewerage and sewage, refuse and garbage, food and milk sanitation. Credit, 3.
MR. PERRIELLO OR MR. WISNIESKI.

163. Industrial Hygiene and Sanitation. Credit, 3.
Prerequisite, permission of instructor. MR. PERRIELLO.

164. Microscopy of Water.—Qualitative and quantitative determination, and control of plankton in potable waters. Credit, 3.
Prerequisite, Bacteriology 31. Mr. Snow.

184. Public Health Administration. Credit, 3.
Mr. Perriello.

186. Field Studies in Sanitation.—Data obtained from milk, water, and sewage treatment plants are evaluated statistically to determine their operating efficiency. Data include laboratory records of bacterial densities, biochemical oxygen demand, dissolved oxygen, and other laboratory or field observations.
Prerequisites, Public Health 161 and 162. Credit, 2.
Mr. Wisnieski.

188. Epidemiology and Communicable Disease Control. Credit, 3.
Prerequisite, permission of instructor. Mr. Wisnieski.

192. Supervised Field Training.—A field training program for majors in Public Health, conducted by the New England Field Training Center of the Training Division of the United States Public Health Service. Appropriate personnel from the Massachusetts Department of Public Health assist as visiting lecturers and in field demonstrations. Summer placement in an accredited health department is required. Credit, 3.
The Staff.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Bacteriology 181. General Applied Bacteriology. Credit, 3.
Mr. France.

Bacteriology 182. Quantitative and Qualitative Bacteriology. Credit, 3.
Miss Garvey.

Bacteriology 215. Antiseptics and Disinfectants. Credit, 3.
Mr. Litsky.

Statistics 179. Elementary Economics Statistics. Credit, 3.
Mr. Russell.

Home Economics 203. Advanced Nutrition—Metabolism of the Major Foodstuffs. Credit, 3.
Miss Mitchell.

Home Economics 204. Advanced Nutrition—Vitamins and Minerals. Credit, 3.
Mrs. Wertz.

Food Technology 191, 192. Analysis of Food Products. Credit, 3 each semester.
Mr. Livingston.

Dairy 209, 210. Seminar. Credit, 1 each semester.
Mr. Hankinson.

Education 120. Construction of Audio-Visual Aids. Credit, 2-3.
Mr. Wyman.

Zoology 169. Animal Parasitology. Credit, 3.
Miss Traver.

ROMANCE LANGUAGES

STOWELL C. GODING, major adviser.

Requirements for admission to candidacy for the M.A. in Romance Languages:

1. A working knowledge of Latin.
2. Good oral proficiency in the major language and acceptable oral proficiency in a second Romance Language.
3. A reading knowledge of a second Romance Language or of German.

Course requirements for the M.A. in Romance Languages:

1. Romance Languages 200 or 300.
2. Romance Languages 201-202.
3. Romance Languages 215-216, from 2 to 6 credits, depending on the individual needs and ability of the student.
4. Superior oral proficiency in the major language and good oral proficiency in the second Romance Language.

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

200. Problem Course.—Directed study in some phase of linguistics or literature. Credit, 3-6.
THE STAFF.

201, 202. Introduction to Romance Philology.—The development of the Romance Languages from Latin: phonology, morphology, and syntax. Given as needed. Credit, 3 each semester.
MR. GODING.

203, 204. Old French Readings.—The evolution of French phonology, morphology, and syntax is traced through the study of some of the earliest monuments of French literature. Given as needed. Credit, 3 each semester.
MR. HULL.

205, 206. Old Spanish Readings.—The evolution of Spanish phonology, morphology, and syntax is traced through the study of some of the earliest monuments of Spanish literature. Credit, 3 each semester.
MR. WEXLER.

215. Seminar in French.—Comprehensive training leading to the now requisite oral mastery of French, to correct grammatical techniques and analyses, to accurate explication de texte, to linguistics and to present-day pedagogical procedures. Credit, 2-3.
THE STAFF.

216. Seminar in Spanish.—Comparable to 215 but in the field of Spanish. Credit, 2-3.
THE STAFF

300. Thesis, Master's Degree. Credit, maximum 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

Courses in French

151, 152. French Literature of the Eighteenth Century.—The chief writers of the Age of Enlightenment. Credit, 3 each semester.
1958-59 and each alternate year. MR. HULL.

153, 154. French Literature of the Twentieth Century.—The modern French Theatre from Scribe to the present. (One semester.) A study of the Modern French Novel from Proust to the present. (One semester.)
Credit, 3 each semester.
Miss Clarke.

155, 156. French Literature of the Seventeenth Century.—The Classic period with readings from the most representative works.
1959-60 and each alternate year. Credit, 3 each semester.
Mr. Johnson.

157, 158. French Literature of the Nineteenth Century.—A detailed study of the more important authors and movements. Credit, 3 each semester.
1958-59 and each alternate year. Mr. Goding.

175, 176. Cours De Style.—Syntax and idiom at an advanced level. The student is taught how to express himself clearly and logically in living French.
Given as needed. Credit, 3 each semester.
Mr. Smith.

179. French Civilization.—A study of those elements which lie back of the cultural contribution of France to world civilization, including arts, sciences, school systems, the press, the family, social classes, influences of history and geography. The assigned readings will be drawn from contemporary French literature. Credit, 3.
1959-60 and each alternate year. Mr. Goding.

180. Advanced Language Study.—Methods of teaching; review of grammar and pronounciation; outside reading and reports. Credit, 3.
1959-60 and each alternate year. Mr. Goding.

Courses in Spanish

163, 164. Advanced Spanish Composition and Syntax.—A study of syntax and idioms, and those more advanced and difficult elements which constitute stylistics. Credit, 3 each semester.
1959-60 and each alternate year. Mr. Wexler.

181. The Romanticists.—Readings, lectures and discussions based on the principal Spanish and Spanish-American writers of the Romantic movement (1809-50 and 1832-88, respectively). Oral and written reports. Conducted in Spanish. Credit, 3.
1958-59 and each alternate year. Mr. Wexler.

182. The Modernists.—Readings, lectures and discussions based on the Spanish-American modernistas of the period 1888-1910 and on their peninsular artistic heirs. Oral and written reports. Conducted in Spanish. Credit, 3.
1958-59 and each alternate year. Mr. Wexler.

183, 184. The Golden Age.—Readings, reports, lectures, and discussions based primarily on the period of maximum creation, 1556-1600. Attention is also paid to the Renaissance precursors (1474-1556) and to the writers of the Baroque era (1600-1700). Conducted in Spanish. Credit, 3 each semester.
1959-60 and each alternate year. Mr. Ferrigno.

185, 186. Cervantes.—Reading of Don Quijote; lectures, discussions, collateral readings and reports. Conducted in Spanish. Credit, 3 each semester.
1958-59 and each alternate year. Mr. Wexler.

SOCIOLOGY

J. H. Korson, major adviser.

Special Departmental Entrance Requirements:

Candidates for admission who plan to major in Sociology must have completed an undergraduate major, or have taken a minimum of 15 credits in Sociology. A student lacking this minimum undergraduate training will be expected to make up deficiencies in the undergraduate college of the University. Exceptions to this rule will be made only on petition of the student to the department. Students who desire to direct their training toward Correctional Administration will be expected to take certain courses in Government and Psychology.

In addition to the general requirements for the Master of Arts degree, found elsewhere in this Bulletin, candidates in Sociology and Anthropology are required to take the Graduate Record Examination before admission, or as soon after as possible.

Degree requirements: 30 credits, of which a minimum of 12 are to be earned in courses at the 200 level, 6 of which must be in Sociology 281 and 282; a minimum of 3 credits in Statistics earned at either the undergraduate or graduate level. Students who are admitted without Statistics are required to take Statistics 177. Students who elect the program in Correctional Administration are expected to earn a minimum of 15 credits at the 200 level. A student may be granted the option of writing a Master's thesis (10 credits) or working on a special problem (3-6 credits).

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

112. Social Change.—Analysis of change as a process, especially the factors making for acceptance or rejection of innovations. Planned and unplanned consequences of social movement, technological invention and culture contact.
Prerequisites, Sociology 72 and permission of instructor. Credit, 3.
Mr. King.

115. The Sociology of Religion.—The relations of religious ideology and ecclesiastical organization to the total social institutional system. Special attention to the religions of larger civilizations, especially Islam, Buddhism, Medieval Christianity, Gentile Paganism, Protestantism, and Judaism. Credit, 3.
Prerequisite, permission of instructor. Mr. Manfredi.

117. Juvenile Delinquency.—Theories of causation and treatment of delinquency. Credit, 3.
Prerequisites, Sociology 78 and permission of instructor. Mr. Yablonsky.

118. Industrial Sociology.—A study of the role, status, and function of the worker in the industrial community; the impact of technological change on the community; analysis of selected occupational functions. Credit, 3.
Prerequisites, Sociology 68 or Economics 79 and permission of instructor.
Mr. Korson.

200. Special Problem.—A special project in Sociology which may serve in lieu of thesis. Credit, 3-6.
Prerequisite, Sociology 193 or equivalent. The Staff.

214. Criminology.—Criminological theories, past and present with special emphasis on present research trends as they relate to theoretical formulations.
Prerequisites, Sociology 78 or equivalent and permission of instructor. Credit, 3.
Mr. Driver.

281. History of Sociological Theory.—A survey of the literature from classical times to the Utilitarians. Credit, 3.
Prerequisites, Sociology 82 and permission of instructor. MR. MANFREDI.

282. Contemporary Sociological Theory.—A survey of the literature from Auguste Comte to the present. Credit, 3.
Prerequisites, Sociology 82 and permission of instructor. MR. MANFREDI.

298. Internship.—Supervised training and practice in the administration of a state correctional institution or organization. Students chosen for this training will serve with one of the following: Women's Reformatory (Framingham), Men's Reformatory (Concord), The Bureau of Classification (Department of Correction), Youth Service Board (Department of Education), The United Prison Association (Boston). A minimum of three months (40-hour weeks) is required and will normally take place the summer following completion of the major part of the student's course work. Credit, 3.
Prerequisites, Sociology 117, 192 and 214. THE STAFF.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

151. Urban Sociology.—A comparative study of modern social conditions, and methods of adjustment, with special reference to city environment. Characteristics of the population, urban ecology, and problems of adjustment in the fields of housing, health, education, and recreation. Credit, 3.
MR. MANFREDI.

152. Rural Sociology.—Rural society from the standpoint of its population, institutions, standards of living, and their relation to urban society. Credit, 3.
MR. MANFREDI.

156. Race Relations.—The social, economic, and political aspects of racial problems in the U. S., with particular reference to the Negro and major ethnic groups. Problems resulting from contact of races in Asia, Africa, and South America. Credit, 3.
MR. KORSON.

157. The Family.—The development of the customs of courtship and marriage of the contemporary American family; basic causes of changes and trends of the family including mate selection, marriage laws, marital prediction, husband-wife relations, and the role of the child. Credit, 3.
MR. KING.

159. Social Stratification.—The factors which make for institutionalized inequality in social life, with major attention to the structure of castes and classes in American society, and to theories of social mobility of the major European and American theorists. Credit, 3.
Three class hours. MR. LEVINE.
Prerequisite, Sociology 25.

161. Population Problems.—The physical and social factors which influence population change through births, deaths, and migration, with special emphasis on the population problems of underdeveloped areas in the world today.
Credit, 3.
MR. WILKINSON.

175. Social Problems.—The incidence, distribution, and interrelations among the major types of social tensions in human societies. Research projects and field trips required. Credit, 3.
MR. LEVINE.

192. **Introduction to Social Welfare.**—Contemporary problems of social concern; methods of caring for adult and child dependents and defectives; public and private agency administration and techniques; and an examination of federal, state, and local community programs. Credit, 3.
MR. YABLONSKY.

193, 194. **Seminar.**—The methods of research employed by social scientists. Research projects must be approved in advance by the instructor. Credit, 3.
Prerequisite, permission of instructor. MR. DRIVER.

Anthropology

COURSES OPEN TO GRADUATE STUDENTS ONLY

(For either major or minor credit)

136. **Individual and Society.**—A cross-cultural consideration of the relationship between the individual and his society with attention to theories, methods and empirical findings as reported in anthropological literature. Credit, 3.
Prerequisites, Anthropology 163, 166 and permission of instructor.
MR. SWARTZ.

137. **Theory in Social Anthropology.**—Theoretical problems which have had a lasting place in anthropological thought; social structure, cultural dynamics and stability, and the transmission of culture as discussed by leading writers. Credit, 3.
Prerequisites, Anthropology 163, 164 and permission of instructor.
MR. SWARTZ.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

163. **Social Anthropology.**—An introduction to the principles of physical and cultural anthropology, including cross-cultural analyses of family systems, religion, economics, linguistics and art. Credit, 3.
Prerequisite, permission of instructor. MR. WILKINSON AND MR. SWARTZ.

164. **Problems in Anthropology.**—The evolution of culture, language, religion, social organization and law. Credit, 3.
Prerequisite, permission of instructor. MR. SWARTZ.

165. **Ethnographic Survey of Non-Literate Peoples.**—The current cultures of representative societies from Africa, Oceania, North America, South America, and Asia viewed in relation to historical and environmental influences.
Prerequisite, permission of instructor. Credit, 3.
MR. SWARTZ.

166. **The Individual and His Society.**—The effect of forces of society in molding the individual with emphasis on the great variety of means through which the basically similar needs of all men are satisfied. Credit, 3.
Prerequisite, permission of instructor. MR. SWARTZ.

Interdepartmental Courses

Social Science 160. **Africa, South of the Sahara.**—An introductory study of recent political, economic, and social developments in the principal countries in Africa, south of the Sahara. Credit, 3.
Prerequisites, at least two courses in one or more of the following fields: Government, Economics, Sociology. MISS CARTER.

Social Science 169. India and Southeast Asia.—An introductory study of recent political, economic, and social developments in India and the countries of South and Southeast Asia. Credit, 3.
Prerequisites, at least two semester courses in one or more of the following fields: Government, Economics, Sociology. MR. DRIVER.

STATISTICS

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

177. Elementary Experimental Statistics. See page 18.

179. Elementary Economics Statistics. See page 18.

180. Advanced Statistical Method. See page 18.

Mathematics 163. Statistics I. See page 91.

Mathematics 164. Statistics II. See page 91.

Psychology 175. Psychological Statistics. See page 106.

COURSE OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

Psychology 216. Advanced Applied Statistics. See page 104.

VETERINARY SCIENCE

COURSES FOR MINOR CREDIT ONLY

175. Comparative Veterinary Anatomy. Credit, 3.
MR. SMITH.

176. General Veterinary Pathology. Credit, 3.
MR. SMITH.

178. General Veterinary Pathology. Credit, 3.
MR. SMITH.

188. Avian Pathology. Credit, 3.
MR. BULLIS.

WILDLIFE MANAGEMENT

REUBEN E. TRIPPENSEE, major adviser.

Graduate work in Wildlife Management is closely tied in with the Cooperative Wildlife Research Station which is now a part of the Department of Forestry and Wildlife Management. Financial support for the Unit is received from the U. S. Fish and Wildlife Service, the Wildlife Management Institute and the State Fish and Game Department. Dr. William G. Sheldon, director of the Research Unit spends approximately half of his time assisting the research activities of the students who work under fellowships received through the Unit. The director of research is automatically on the graduate committee of each student who receives funds through the Unit.

WILDLIFE MANAGEMENT

Undergraduate students who have received their bachelor's degree in Wildlife Management at the University of Massachusetts are strongly urged to pursue graduate work at another University. Opportunities for fellowships in this field are usually available at other Cooperative Units.

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems in Wildlife Management. Credit, 3 per semester. Maximum credit, 6.
THE STAFF.

201. North American Animals.—The taxonomy, life histories and ecological interrelationships of certain North American vertebrates. Credit, 3.
MR. TRIPPENSEE.

202. Wildlife Administration.—The organization and operation of state and federal agencies and certain associations concerned with wildlife management. Prerequisite, Wildlife Management 27 or equivalent. Credit, 3.
MR. TRIPPENSEE.

203. Wild Animal Abundance.—The factors which influence wild animal abundance. Credit, 3.
MR. TRIPPENSEE.

204. Land Use and Wildlife.—Wildlife populations on different ecological sites with special emphasis on the indirect influence of land use practices and natural vegetative succession. Credit, 3.
Prerequisites, Agronomy 2, Botany 181, Forestry 55 and 56 or equivalents.
MR. SHELDON AND MR. TRIPPENSEE.

205. Management of Wet Lands and Water in Relation to Wildlife. Credit, 3.
MR. SHELDON AND MR. TRIPPENSEE.

300. Thesis, Master's Degree. Credit, 10.

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS
(For either major or minor credit)

170. Game Birds and Mammals.—Life histories, ecology and methods of management. Credit, 3.
MR. TRIPPENSEE.

171. Waterfowl Management.—Life histories and factors which affect abundance of waterfowl. Credit, 3.
MR. TRIPPENSEE.

173. Predaceous Birds and Injurious Rodents.—Life histories, ecology and control. Credit, 3.
MR. TRIPPENSEE.

174. Techniques in Wildlife Management.—Analysis of cover, census methods, food habit studies, and determination of flock and herd age and sex composition of game animals. Credit, 3.
MR. TRIPPENSEE.

175. Management of Furbearers.—Life histories and management of furbearers and nomenclature of the fur trade. Credit, 3.
MR. TRIPPENSEE.

185. Wildlife Literature.—A review of the more pertinent literature relating to vertebrate animals and their ecology. Credit, 2.
One 2-hour seminar. Mr. Sheldon.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Botany 167, 168. Introductory Plant Physiology. Credit, 3 each semester.
Mr. Gentile.

Botany 181. Plant Ecology. Credit, 3.
Mr. Livingston.

Education 166. Preparation and Use of Audio-Visual Aids. Credit, 2-3.
Mr. Wyman.

Entomology 190. Evolution. Credit, 2-3.
Mr. Hanson.

Entomology 212. Geographical Distribution of Animals and Plants. Credit, 3.
Mr. Alexander.

Forestry 171. Aerial Photogrammetry. Credit, 3.
Mr. MacConnell.

Forestry 180. Principles of Forest Management. Credit, 3-5.
Mr. MacConnell.

Statistics 179. Elementary Economics Statistics. Credit, 3.
Mr. Russell.

Zoology 169. Animal Parasitology. Credit, 3.
Miss Traver.

Zoology 171. Comparative Vertebrate Anatomy. Credit, 3.
Mr. Bartlett and Mr. Snyder.

Zoology 172. Vertebrate Embryology. Credit, 3.
Mr. Woodside.

Zoology 174. Limnology.—A study of inland waters. Credit, 4.
Miss Traver in cooperation with the Departments of Botany, Entomology, Geology, Public Health and Zoology.

Zoology 181. Vertebrate Zoology. Credit, 3.
Mr. Andrews.

Zoology 182. Mammalogy. Credit, 3.
Mr. Snyder.

Zoology 183. General Cellular Physiology. Credit, 4.
Mr. Swenson.

Zoology 184. Comparative Physiology. Credit, 4.
Mr. Roberts.

Zoology 186. Fishery Biology. Credit, 3.
Mr. Andrews.

Zoology 187. Endocrinology. Credit, 3.
Mr. Snedecor.

Zoology 200. Special Problems. Credit, 1-6.
The Staff.

ZOOLOGY

GILBERT L. WOODSIDE, major adviser.

In order to be considered for graduate standing students must offer at least twenty credits in biology. Three letters of recommendation are necessary when making application for admission.

Students will be expected to take a written departmental proficiency examination supplemented by an oral examination at the discretion of the staff early in the first year of residence.

The Master of Arts degree will be awarded to graduate students in Zoology who successfully complete the basic requirements stated on page — and the following specific requirements: If a ten credit thesis is offered, the student must pass an oral examination; if no thesis is offered, fifteen credits must be in the "200" category (Courses Open to Graduate Students Only) and the student must pass a written examination.

All Ph.D. candidates must have the following courses or their equivalents as soon as possible after admission: Zoology 150, 153, 171, 172, 181, 183, and 184. The student should select at least one course of an advanced nature (preferably a "200-series" course) in each of the following areas to insure that he will have advanced work in each phase of Zoology.

A. Morphology
B. Physiology
C. Genetics
D. Invertebrate Zoology
E. Vertebrate Zoology

COURSES OPEN TO GRADUATE STUDENTS ONLY
(For either major or minor credit)

200. Special Problems. Credit, 1-6.
THE STAFF.

202. Advanced Invertebrate Zoology.—Morphology, habits and life cycles of fresh-water invertebrates. Credit, 3.
Laboratory, discussion periods, field trips. MISS TRAVER.
Prerequisite, Zoology 25, 170, 174 or equivalent.

204. Helminthology.—Morphology, classification and life histories of the principal groups of parasitic helminths. Credit, 3.
Laboratory, seminar reports. MISS TRAVER.
Prerequisite, Zoology 169 or equivalent.

220. Experimental Embryology.—The chief factors in the physiology of development: the germ cells, fertilization, establishment of the primary axis, embryonic induction, and differentiation. Credit, 3.
1959-60 and each alternate year. MR. WOODSIDE.
Prerequisite, Zoology 172 or equivalent.

240. Advanced Cellular and Comparative Physiology.—Detailed study of one or more of the following topics: radiation biology, physiological adaptations, enzymology, and submicroscopic structure of protoplasm. Credit, 2-4.
Prerequisites, Zoology 183 and 184.
MR. SWENSON, MR. ROBERTS, AND MR. MONER.

245. **Advanced Vertebrate Physiology.**—Experience in small animal surgery and in making standard experimental preparations; suitable techniques for recording results; special emphasis on proper interpretation of data. Credit, 3.
1959-60 and each alternate year. MR. SNEDECOR.
One class hour; one 4-hour laboratory period.
Prerequisites, Zoology 35 and 171.

248. **Physiological Genetics.**—The nature of the gene and its action in the developmental and physiological processes of the organism. Credit, 3.
1958-59 and each alternate year. MR. RAUCH.
Prerequisites Zoology 153, or equivalent, and permission of instructor.

255. **Departmental Seminar.** Credit, 1 each semester.
Maximum credit, 4.
THE STAFF.

260. **Physiology Seminar.** Credit, 1 each semester.
Maximum credit, 3.
MR. SWENSON.

265. **Animal Behavior.**—The evolution and significance of behavior patterns including territorialism, mating, parental care, migration and orientation of invertebrates and lower vertebrates. Credit, 3.
Two 2-hour lecture-discussion periods. MR. BARTLETT AND MR. NUTTING.
Prerequisites, Zoology 153, 180 or 181 or 182, and 169 or 170.

273. **General Cytology.**—The morphological features of cells in relation to their function. Lectures, seminar reports and individual laboratory work.
1958-59 and each alternate year. Credit, 3.
Prerequisite, Zoology 150. MR. ROLLASON.

286. **Principles of Systematic Zoology.**—The objectives, approaches and results of research in systematic zoology, including procedures applicable to binomial naming with particular emphasis on analytical procedures for determining lower taxonomic groups. Credit, 2.
Prerequisites, Zoology 153, 171, 172, and one of the following: 170, 180, 181 or 182. THE STAFF.

300. **Thesis, Master's Degree.** Credit, 10.

400. **Thesis, Ph.D. Degree.** Credit, 30

COURSES OPEN TO BOTH GRADUATE AND UNDERGRADUATE STUDENTS

(For either major or minor credit)

150. **Histology of the Vertebrates.**—The tissues and organs of the vertebrates, especially mammals. Credit, 3.
Prerequisite, Zoology 1. MR. ROLLASON.

153. **Principles of Genetics.**—Lectures and laboratory experiments concerning the laws governing the transmission of hereditary factors in plants and animals, expression and action of genes, population genetics, and the relationship of genetics to other biological sciences. Credit, 3.
Two class hours; one 3-hour laboratory period. MR. RAUCH.
Prerequisite, Zoology 1.

164. **Biology of Protozoa.**—The morphology, systematics, physiology, and ecology of Protozoa with a consideration of the contributions to the problems of biology made through the study of these organisms. Credit, 3.
1959-60 and each alternate year. MR. HONIGBERG.
One lecture hour; one 2-hour and one 3-hour laboratory period.
Prerequisite, Zoology 1 and permission of instructor.

169. Animal Parasitology.—Representative protozoan and helminthic parasites of man and domestic animals, with special reference to morphology and life cycles. Credit, 3.
Lectures, laboratory. Miss Traver.
Prerequisite, Zoology 1.

170. Invertebrate Zoology.—Survey of the phyla of invertebrate animals from evolutionary and phylogenetic aspects. Credit, 3.
1958-59 and each alternate year. Miss Traver.
Lectures, discussion periods, laboratory.
Prerequisite, Zoology 1.

171. Comparative Vertebrate Anatomy.—A thorough study of the anatomy of the vertebrates, with emphasis on the evolution, special modifications, and functional interrelationships of each of the organ systems. Credit, 4.
Two class hours; two 3-hour laboratory periods.
Prerequisite, Zoology 1. Mr. Bartlett and Mr. Snyder.

172. Vertebrate Embryology.—Lectures and laboratory work dealing with the development of representative animals, special emphasis being placed on the amphibian, bird and mammal. Credit, 4.
Two class hours; two 3-hour laboratory periods.
Prerequisite, Zoology 171. Mr. Woodside, Mr. Rauch, and Mr. Bartlett.

174. Limnology.—Study of inland waters, emphasizing geological, physical, chemical and biological aspects. Credit, 4.
1959-60 and each alternate year. Miss Traver.
Lectures, laboratory, field trips.
Prerequisites, Botany 1, Zoology 1, Chemistry 1 and 2, and permission to register.

178. Genetics of Animal Populations.—The principles of the genetics of animal populations with emphasis upon its basic techniques and methods, its goals and contributions; the population approach to the study of the origin of species and human genetics. Credit, 2.
1959-60 and each alternate year. Mr. Rauch.
Enrollment limited to 10.
One 2-hour lecture-discussion period per week.
Prerequisites, Zoology 153 or equivalent and permission of instructor.

180. Ornithology.—An introduction to the study of avian biology with emphasis on structural and functional adaptations, and particularly the behavioral patterns of birds. Laboratory periods include discussions of assigned readings in current literature in addition to field trips for identification and methods of field study. Credit, 3.
Two class hours; one 2-hour laboratory period.
Prerequisite, Zoology 1. Mr. Bartlett and Mr. Nutting.

181. Vertebrate Zoology.—Classification and ecology, with particular emphasis on the fishes. Credit, 3.
One class hour; two 2-hour laboratory periods. Mr. Andrews.
Prerequisite, Zoology 1.

182. Mammalogy.—The evolution, distribution, classification and natural history of mammals with emphasis on local fauna in the laboratory. Two or three field trips required. Enrollment limited to 15. Credit, 3.
1958-59 and each alternate year. Mr. Snyder.
Two class hours; one 3-hour laboratory period.
Prerequisites, Zoology 1 and permission of instructor.

183. General and Cellular Physiology.—Modern trends in physiology with emphasis on the chemical and physical properties of cells, including protoplasmic organization, cellular metabolism, permeability, bioelectric phenomena, muscle contraction, and radiation biology. Credit, 4.
Three class hours; one 3-hour laboratory period. Mr. Swenson.
Prerequisites, one year biology and organic chemistry.

184. Comparative Physiology.—Physiological principles involved in adaptations of animals to their environment; emphasis in the laboratory on experimental methods used to study adaptive mechanisms. Credit, 4.
Three class hours; one 3-hour laboratory period. Mr. Roberts.
Prerequisites, Zoology 1, 35 or 183.

186. Fishery Biology.—The regulation of fresh-water fisheries; the physical and biological conditions of the environment and their influence on fish populations. Credit, 3.
Prerequisite, Zoology 181 or permission of instructor. Mr. Andrews.

187. Endocrinology.—The importance of the endocrines in their control over normal functions (growth, metabolism, reproduction, etc.) in a variety of animals. Credit, 3.
Two class hours; one 3-hour laboratory period. Mr. Snedecor.

COURSES IN OTHER DEPARTMENTS FOR WHICH MAJOR CREDIT WILL BE GIVEN

Chemistry 193, 194. Biochemistry. Credit, 4 each semester.
Mr. Little.

Entomology 212. Geographical Distribution of Plants and Animals.
Credit, 2, 1st semester; 3, 2nd semester.
Mr. Alexander.

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Other University of Massachusetts Catalogs:

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- Stockbridge School Catalog
- Summer School Catalog